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MONTHLY WEATHER REVIEW

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CONTENTS

	Page
Observations of Middle and Lower Cloud Conditions During Winter and Spring. William Lewis	1
Meteorological and Climatological Data:	
Aerological Observations	5
River Stages and Floods	10
Climatological Data	13
Solar Radiation and Sunspot Data:	
Solar Radiation Observations	19
Charts I–XI.	

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OBSERVATIONS OF MIDDLE AND LOWER CLOUD COMPOSITION DURING WINTER AND SPRING

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The meteorological importance of the state of the water particles in clouds was emphasized several years ago by the work of Bergeron [1] and Findeisen [2, 3] on the mechanism of precipitation. More recently the discovery by Schaefer [4] of a method of introducing dry-ice nuclei into water clouds, thus realizing the possibility of some control of precipitation which was recognized earlier by Findeisen, has again directed attention to the subject. Many American meteorologists considered Findeisen's arguments unconvincing, probably because he failed to present specific observational data to support them. Since the results of recent observations tend to confirm several important points in his discussion of cloud structure and precipitation, it is believed pertinent to bring up the subject again in order to present the results here, even though most of the ideas involved are not new. In this paper the principal middle and lower cloud types will be discussed with reference to whether they are ordinarily composed of ice particles or liquid water drops.

The program of ice-prevention research being conducted by the National Advisory Committee for Aeronautics at the Ames Aeronautical Laboratory has resulted in the accumulation of a considerable number of direct observations of cloud composition. A quantitative study of drop size and liquid water content in clouds has previously been presented as part of the results of this program [5]. In this paper the purpose is to present the results of qualitative observations of the state of the water particles of various types of clouds. The observations were made during the winter and spring seasons of 1945–46 and 1946–47. Although most of the flights were in the Pacific Northwest and the northern Plateau region, some data were also taken in the eastern United States. All of the observations included in this study were made at temperatures below freezing.

OBSERVATIONAL DATA

It was found that the presence or absence of ice crystals (or snow[2]) in the air can best be determined in flight by visual observation against a very dark background such as an opening in the nacelle. Against such a background the individual ice particles were seen as discrete streaks of light, while liquid cloud drops, being much smaller and more numerous, appear as a nebulous haze. This visual technique gave a positive means of distinguishing between liquid drops and ice crystals, evidenced by the fact that ice always formed on the thermometer strut, located just outside the observer's window, whenever the milky haze characteristic of liquid water clouds was seen in flight, and conversely, never formed in the absence of this haze, even when the light streaks characteristic of ice crystals were observed.

Another indication of the presence and approximate size of the ice crystals was obtained by means of a small piece of black sponge rubber. It was placed in the thermometer mounting bracket on the plane and located in such a position that an area about 0.5 cm. wide was exposed at right angles to the air stream. Individual ice crystals could be clearly seen as they struck this surface and remained motionless for a few seconds, before evaporating under the influence of dynamic heating. The average diameter of the particles thus observed was estimated at between 0.5 and 1 mm.

For the purpose of this study, the observations of cloud composition were divided into three categories: (*a*) Clouds composed entirely of liquid water drops or containing only an insignificant quantity of ice crystals; (*b*) Clouds composed entirely of ice crystals or containing an insignificant amount of liquid water; and (*c*) Clouds of mixed composition. The number of cases observed to fall in each category was tabulated for each of the principal cloud forms defined in the International Atlas [6]. The cloud forms were identified on the basis of visual observations made from the clear air outside the cloud masses. The results are presented in Table 1.

TABLE 1.—*Observations of the composition of clouds at temperatures below freezing*

Cloud type	Number of cases		
	Liquid drops	Ice crystals	Ice crystals and liquid drops
Middle clouds:			
Altostratus	3	27	7
Altocumulus	15	0	0
Low clouds:			
Stratocumulus	19	0	9
Stratus	4	0	1
Nimbostratus	1	4	1
Clouds with vertical development:			
Cumulus	21	0	5
Cumulonimbus	0	2	8

DISCUSSION

Altostratus clouds.—As the summary in Table 1 shows, a great majority of the altostratus clouds observed were composed almost entirely of ice crystals. This observed structure is consistent with the model of precipitating stratiform clouds proposed by Findeisen [2, 3] but refutes the opinions of many meteorologists in this country. In accepting the international definitions of cloud forms

[1] The author is an employee of the U. S. Weather Bureau assigned to Ames Aeronautical Laboratory.

[2] The terms "ice crystals" and "snow" are here used interchangeably, since all but the smallest ice crystals in clouds are large enough to fall with an appreciable velocity. The distinction between cloud and precipitation particles, though valid for liquid drops, does not apply to ice crystals.

[6], wherein altostratus clouds are distinguished from cirrostratus clouds by the absence of halos in the former, it is believed that these meteorologists have tacitly assumed that the absence of halos implies the absence of ice crystals. This, however, is not the case. Halos are formed only in clouds in which simple hexagonal prisms are the predominant crystal form, and are not observed in connection with hexagonal plates, capped columns, star-shaped forms, or other crystal types, as pointed out by Weickmann [7]. In flights within or over altostratus clouds, the frequent observation of a diffuse bright spot or streak below the sun, believed to be produced by diffuse reflection from a horizontal surface, has suggested that these clouds are usually composed predominantly of flat-plate-type crystals and that the most probable orientation of the plates is horizontal, or oscillating about the horizontal.

In order to illustrate the difference in physical characteristics of clouds composed of liquid drops and those composed of ice crystals, Table 2 has been prepared to show a hypothetical comparison between them when they have the same free water content. The value of 0.2 grams of free water per cubic meter was chosen as typical of middle clouds composed of liquid drops. The free water content of similar clouds composed of ice crystals has not been measured but is believed to be of the same order of magnitude. Data for liquid clouds were based mainly on the measurements made in the course of the N. A. C. A. icing research program [5]; data for ice crystal clouds were based mainly on the measurements of snow crystals reported by Schaefer [8]. The hexagonal-plate-type crystal was chosen as typical for altostratus clouds, and values of its dimensions were based on the data given by Schaefer. The outstanding difference between water and ice clouds is in the number and size of the particles, since the liquid water drops are about 10,000 times as numerous and $\frac{1}{10,000}$th as heavy as the ice crystals.

TABLE 2.—*A comparison of the physical characteristics of typical clouds of middle levels composed of (a) liquid water and (b) ice crystals, with the sources of information indicated*

Physical characteristics	Cloud composition			
	Liquid water		Ice crystals	
Free water content [1]	0.2 gm/m³	(a)	0.2 gm/m³	
Shape of average particle	sphere		hexagonal plate	
Diameter of average particle [1]	1.3×10^{-3} cm	(b)	6×10^{-2} cm	(c)
Thickness of average particle [1]			4×10^{-3} cm	(c)
Average projected area of particle [2] [3]	1.3×10^{-6} cm²		2.0×10^{-5} cm²	
Mass of average particle [2]	1.15×10^{-6} gm		1.4×10^{-6} gm	
Number of particles per cubic meter [1]	1.74×10^{5}		1.4×10^{4}	
Rate of fall of average particle	0.52 cm/sec	(d)	50 cm/sec	(c)
Distances of fall of average particle in air with 90 percent relative humidity.	0.006 m	(e)	100 m	(f)
Total projected area of particle per cubic meter [2]	231 cm²		28 cm²	
Visibility	195 m	(g)	1,610 m	(h)

[1] Assumed quantity.
[2] Calculated from assumed data.
[3] Random orientation of ice particles is assumed.
(a) From data by the author [5].
(b) Median of a number of cases, by the author.
(c) From data of Schaefer [8].
(d) From data of Simpson [11].
(e) From data of Findeisen, given by Simpson [11].
(f) One-third of distance used for drops of same mass.
(g) From Traubert's formula, given by Kampe [12].
(h) Determined by increasing the visibility for a cloud of liquid water in proportion to the total projected areas of the particles for the 2 types of clouds.

In the course of the flight program it was noted that the principal properties set forth by the International Atlas for defining altostratus clouds are characteristic of ice-crystal clouds. These are (*a*) striated or fibrous appearance; (*b*) sun or moon showing vaguely, with a gleam, as through ground glass; and (*c*) the absence of real relief on the lower surface of the cloud. That these properties are characteristic of ice-crystal clouds may be readily understood by reference to Table 2. The striated and fibrous appearance is due to the very considerable falling velocity, especially of the larger particles, which gives rise to many small streaks, resembling virga, in the base of the cloud. If vertical wind shear is present, as is the case when the cloud is formed above a frontal surface, these streaks are inclined from the vertical and may become nearly horizontal. The fact that the sun or moon can be seen vaguely through a relatively thick layer is due to the high visibility in ice-crystal clouds as compared with water-drop clouds with the same free water content. Humphreys [9] has shown that the optical effect of flat-plate crystals falling horizontally is the illumination of the sky at all distances from the sun out to 115 degrees, which accounts for the ground-glass appearance and whitish gleam also mentioned in the International Atlas as characteristic of altostratus clouds.

Because of their relatively large size, ice crystals can fall to considerable distances below the cloud base without evaporating, which gives rise to the diffuse lower boundary of the cloud mass described in the International Atlas. Drops which constitute water clouds, on the other hand, cannot fall below the cloud base without evaporating; hence, liquid clouds are ordinarily characterized by sharp bases showing real relief. Only in exceptional cases, when cloud drops approaching drizzle size (0.01 cm. or more in diameter) are present, may liquid clouds have diffuse bases.

Altocumulus clouds.—As shown by the data in Table 1, altocumulus clouds were found to be composed usually of liquid drops. According to the International Atlas, the features which distinguish a continuous sheet of altocumulus clouds from altostratus clouds are that the elements of altocumulus clouds show in real relief on the surface of the cloud, and that striated or fibrous structure is absent in them. As explained in the preceding section, these are characteristics of clouds composed of liquid drops.

Altocumulus clouds are often found on the lateral edges of middle cloud systems associated with depressions. They give way to altostratus as the central precipitation area is approached, and in this region of transition, the cloud forms containing both ice crystals and water drops occur. In this unstable state the water drops soon disappear, due to the difference between the vapor pressure over ice and that over water. Conditions of this kind may account for the seven cases of mixed composition classified as altostratus in Table 1. The three cases of liquid clouds classified in the table as altostratus are believed due to a mistake in the identification of the cloud type, a smooth altocumulus opacus being confused by the observer with altostratus.

Occasionally patches of altocumulus are observed near the top of large and very tenuous masses of altostratus. Findeisen [2, 3], in discussing this case, concluded that these liquid altocumulus clouds were formed in a region from which nearly all of the ice nuclei had already fallen as snowflakes.

Stratus and stratocumulus clouds.—Typical stratus and stratocumulus clouds were observed to be composed of liquid drops. There were also a number of cases of mixed composition, where conditions are unstable and therefore transient. As indicated in Table 1, they occur with considerable frequency. Light snow sometimes forms within these clouds, causing gradual dissipation of the cloud from the base upwards; this happens most frequently when the temperatures are below −10° C. Snow also sometimes

falls into stratocumulus layers from above, usually from an overlying layer of altostratus, causing rather rapid depletion of the liquid water in the cloud.

Nimbostratus clouds.—The name nimbostratus is usually applied to the lower portions of precipitating altostratus-type cloud systems. Such clouds would be expected to consist of ice crystals above the freezing level and a mixture of falling rain and liquid cloud droplets below the freezing level, with a mixture of liquid cloud drops and snowflakes just above the freezing level, as discussed by the author elsewhere [**10**].

The observed case of mixed composition at below-freezing temperature, classified as nimbostratus in Table 1, was a stratocumulus cloud in process of depletion after the onset of precipitation. The case of nimbostratus composed of liquid drops, listed in Table 1, was observed in a situation in which light, fine rain was produced from clouds composed entirely of liquid drops. In three winters' observations, the latter case was the only one in which liquid precipitation was found to form at temperatures below freezing. It occurred during the passage of a cold front in the vicinity of Seattle, Wash.

Cumulus and cumulonimbus clouds.—The observations listed in Table 1 are consistent with the generally accepted idea that the transformation from cumulus to cumulonimbus is brought about by the formation of ice crystals in the upper portion of the cloud. In the listing, the cases of clouds of mixed composition which were classified as cumulus rather than cumulonimbus were a result of the fact that the visible characteristics of cumulonimbus (noticeable softening of outlines and appearance of fibrous structure) do not appear immediately when the transformation into cumulonimbus first begins. The structure is first apparent only after ice crystals begin to predominate in certain parts of the cloud.

Conditions within cumulonimbus clouds are highly variable. Regions of high water content, composed almost entirely of liquid cloud droplets, often alternate with regions of heavy precipitation consisting of snow, graupel, and hail, in which liquid water is almost completely absent. Measurements of liquid water content during the transformation of a cumulus congestus cloud into cumulonimbus showed a decrease from 1.9 to 0.2 grams per cubic meter in less than 20 minutes, illustrating the extreme rapidity of the change.

CONCLUSIONS

The following conclusions regarding cloud composition are based upon observations of middle and lower clouds at temperatures below freezing during winter and spring:

1. Altostratus and nimbostratus clouds are usually composed of ice crystals.
2. Cumulus, altocumulus, stratocumulus, and stratus clouds are generally composed of liquid drops.
3. Cumulonimbus clouds and certain transitional cases of stratocumulus and altostratus clouds contain a mixture of ice crystals and liquid drops.

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METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR JANUARY 1948

AEROLOGICAL OBSERVATIONS

[For description of change in Table 1 and charts, see REVIEW, January 1946, p. 6]

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during January 1948*

STATIONS AND MEAN SURFACE PRESSURES

Standard pressure surface (mb.)	Albany, N. Y. (1,008.5 mb.)				Albuquerque, N. Mex. (838.5 mb.)				Apalachicola, Fla. (1,020.0 mb.)				Atlanta, Ga. (985.2 mb.)				Auburn, Calif. (960.9 mb.)				Big Spring, Tex. (930.6 mb.)				Bismarck, N. Dak. (958.0 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	86	−8.7	75	31	1,620	1.3	57	31	5	9.5	81	31	300	2.9	70	31	501	9.8	64	30	774	3.2	54	31	505	−11.0	87
1,000	31	151	(*)	----	31	175	(*)	----	31	169	10.3	76	31	178	(*)	----	31	168	(*)	----	30	181	(*)	----	31	170	(*)	----
950	31	553	−9.4	77	31	606	(*)	----	31	602	9.7	70	31	597	2.9	65	31	598	10.9	58	30	606	(*)	----	31	573	−12.2	84
900	31	965	−10.7	78	31	1,050	(*)	----	31	1,045	8.7	56	31	1,032	3.1	61	31	1,047	10.6	40	30	1,045	4.3	48	31	984	−9.4	74
850	31	1,404	−11.9	81	31	1,509	(*)	----	31	1,517	7.5	46	31	1,495	2.7	54	31	1,521	8.5	35	30	1,509	2.8	50	31	1,426	−9.2	67
800	31	1,867	−13.1	75	31	1,998	1.6	50	31	2,015	6.2	45	31	1,985	1.5	53	31	2,020	5.9	36	30	1,998	1.7	44	31	1,894	−9.9	62
750	31	2,365	−14.0	66	31	2,522	−.7	48	31	2,550	3.8	46	31	2,507	−.6	51	31	2,549	3.0	39	30	2,525	.9	41	31	2,397	−11.8	60
700	31	2,880	−15.4	63	31	3,065	−3.4	53	31	3,100	1.2	44	31	3,051	−3.2	53	31	3,101	.2	----	30	3,070	−.9	34	31	2,917	−14.4	59
650	31	3,446	−17.7	62	31	3,647	−6.4	49	31	3,696	−1.8	40	31	3,638	−6.1	52	30	3,693	−3.2	----	30	3,664	−4.2	32	31	3,481	−17.3	59
600	31	4,032	−20.4	61	31	4,269	−9.8	44	31	4,325	−5.0	----	31	4,258	−9.2	49	30	4,320	−7.3	----	30	4,285	−8.2	----	31	4,071	−20.8	----
550	31	4,675	−24.0	----	31	4,935	−13.9	40	31	5,003	−9.2	----	31	4,930	−13.0	50	30	4,992	−11.8	----	30	4,956	−12.4	----	31	4,711	−25.0	----
500	31	5,362	−28.1	----	31	5,653	−18.5	----	31	5,733	−14.3	----	31	5,646	−17.6	50	30	5,714	−17.0	----	30	5,676	−17.6	----	31	5,395	−29.5	----
450	31	6,116	−32.6	----	31	6,435	−24.0	----	31	6,531	−20.2	----	31	6,434	−22.9	----	30	6,505	−22.8	----	30	6,462	−23.1	----	31	6,146	−34.5	----
400	31	6,933	−37.9	----	31	7,280	−30.3	----	30	7,387	−26.3	----	31	7,280	−28.9	----	30	7,349	−29.1	----	30	7,309	−29.7	----	30	6,950	−40.3	----
350	31	7,840	−43.9	----	31	8,215	−37.3	----	30	8,338	−33.5	----	31	8,221	−36.2	----	30	8,288	−36.6	----	30	8,247	−36.6	----	29	7,854	−46.1	----
300	30	8,868	−49.6	----	30	9,269	−44.7	----	30	9,402	−41.6	----	31	9,271	−44.2	----	30	9,336	−45.4	----	30	9,297	−44.3	----	26	8,889	−50.8	----
250	23	10,056	−52.6	----	27	10,478	−50.7	----	29	10,618	−49.9	----	31	10,473	−51.2	----	27	10,535	−53.6	----	29	10,504	−51.3	----	22	10,067	−53.1	----
200	9	11,532	−54.1	----	13	12,019	−53.6	----	26	12,063	−56.0	----	25	11,920	−53.2	----	24	11,956	−57.4	----	24	11,936	−54.4	----	16	11,501	−51.6	----
175	----	----	----	----	----	----	----	----	24	12,920	−58.5	----	19	12,764	−54.3	----	21	12,804	−58.0	----	12	12,819	−53.7	----	13	12,358	−50.0	----
150	----	----	----	----	----	----	----	----	16	13,880	−61.4	----	11	13,754	−57.2	----	18	13,759	−59.2	----	----	----	----	----	8	13,431	−49.9	----
125	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	14	14,924	−61.6	----	----	----	----	----	----	----	----	----

Standard pressure surface (mb.)	Boise, Idaho (922.9 mb.)				Brownsville, Tex. (1,019.5 mb.)				Buffalo, N. Y. (992.0 mb.)				Caribou, Maine (992.1 mb.)				Charleston, S. C. (1,018.8 mb.)				Ciudad Victoria, Mexico (977.2 mb.)				Columbia, Mo. (993.6 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	868	0.5	73	31	6	12.2	82	31	221	−7.2	80	31	191	−13.6	86	31	13	5.4	76	31	335	16.0	61	30	239	−4.5	73
1,000	31	216	(*)	----	31	167	12.3	79	31	157	(*)	----	31	127	(*)	----	31	165	6.3	74	31	137	(*)	----	30	186	(*)	----
950	31	635	(*)	----	31	603	11.5	75	31	560	−9.0	81	31	520	−14.1	87	31	592	6.0	71	31	577	15.0	58	30	593	−5.4	72
900	31	1,069	1.4	63	31	1,048	10.6	69	31	973	−10.9	83	31	927	−14.8	84	31	1,028	5.5	62	31	1,029	12.0	61	30	1,014	−6.7	66
850	31	1,528	−.7	60	31	1,524	9.3	65	31	1,410	−12.3	79	31	1,359	−15.0	80	31	1,495	4.3	60	31	1,506	9.7	65	30	1,460	−6.8	62
800	31	2,011	−2.6	61	31	2,026	8.5	53	31	1,873	−13.4	71	31	1,817	−15.9	71	31	1,987	2.6	56	31	2,009	9.0	65	30	1,932	−7.5	55
750	31	2,525	−4.8	62	31	2,568	6.8	45	31	2,372	−14.2	61	31	2,306	−17.4	67	31	2,515	0.1	54	31	2,552	8.0	52	30	2,439	−8.8	54
700	31	3,061	−7.6	61	31	3,123	4.0	45	31	2,885	−16.4	54	31	2,817	−19.1	64	31	3,058	−2.3	47	31	3,110	4.8	46	30	2,966	−11.0	50
650	31	3,639	−10.4	57	31	3,726	.1	42	31	3,449	−19.0	48	31	3,372	−21.5	----	31	3,650	−5.1	43	31	3,712	0.6	46	30	3,538	−13.4	50
600	31	4,248	−13.4	59	31	4,358	−3.7	----	31	4,031	−22.0	----	31	3,952	−24.1	----	30	4,269	−8.6	42	31	4,348	−3.4	41	30	4,138	−16.5	51
550	31	4,911	−16.8	56	30	5,044	−8.0	----	30	4,671	−25.6	----	30	4,582	−27.6	----	29	4,943	−12.4	----	31	5,033	−7.5	39	30	4,793	−20.0	----
500	31	5,616	−21.3	----	30	5,775	−13.1	----	30	5,352	−29.1	----	30	5,259	−31.5	----	29	5,661	−17.0	----	31	5,767	−12.4	41	30	5,489	−24.0	----
450	31	6,391	−26.4	----	29	6,577	−18.9	----	30	6,104	−33.6	----	29	6,008	−36.0	----	27	6,449	−22.6	----	31	6,575	−18.0	47	29	6,262	−29.3	----
400	31	7,226	−32.6	----	29	7,435	−25.3	----	29	6,916	−39.2	----	28	6,814	−41.1	----	27	7,298	−28.0	----	30	7,438	−24.0	----	29	7,087	−35.0	----
350	31	8,152	−39.7	----	28	8,389	−32.5	----	25	7,810	−45.4	----	26	7,714	−46	----	27	8,243	−35.0	----	30	8,397	−31.9	----	29	8,006	−41.1	----
300	31	9,187	−47.9	----	28	9,456	−40.9	----	23	8,822	−50.4	----	20	8,722	−51.2	----	25	9,299	−42.7	----	27	9,469	−40.1	----	24	9,075	−47.0	----
250	29	10,372	−54.8	----	27	10,671	−49.3	----	16	10,017	−52.4	----	14	9,888	−52.2	----	24	10,506	−51.0	----	8	10,725	−48.3	----	20	10,302	−51.7	----
200	18	11,804	−54.8	----	19	12,118	−55.4	----	10	11,456	−49.6	----	7	11,244	−46.8	----	21	11,928	−56.3	----	----	----	----	----	13	11,797	−50.8	----
175	12	12,660	−54.2	----	16	12,964	−57.2	----	----	----	----	----	6	12,142	−47.0	----	19	12,779	−57.5	----	----	----	----	----	9	12,649	−51.1	----
150	7	13,654	−56.8	----	7	13,945	−60.5	----	----	----	----	----	----	----	----	----	16	13,736	−59.7	----	----	----	----	----	5	13,665	−53.2	----

Standard pressure surface (mb.)	Dodge City, Kans. (928.6 mb.)				El Paso, Tex. (883.5 mb.)				Ely, Nev. (811.5 mb.)				Forth Worth, Tex. (997.2 mb.)				Glasgow, Mont. (941.1 mb.)				Grand Junction, Colo. (855.8 mb.)				Great Falls, Mont. (877.7 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	787	−2.9	67	31	1,195	5.0	49	31	1,908	−3.1	60	31	211	3.5	69	31	648	−6.2	75	31	1,474	−3.8	70	31	1,128	−1.6	61
1,000	31	192	(*)	----	31	164	(*)	----	31	209	(*)	----	31	187	.8	63	31	166	(*)	----	31	223	(*)	----	31	166	(*)	----
950	31	606	(*)	----	31	596	(*)	----	31	636	(*)	----	31	610	3.1	61	31	577	(*)	----	31	645	(*)	----	31	586	(*)	----
900	31	1,035	−1.3	60	31	1,047	(*)	----	31	1,073	(*)	----	31	1,042	1.7	61	31	997	−3.9	66	31	1,077	(*)	----	31	1,019	(*)	----
850	31	1,489	−2.4	59	31	1,512	5.8	43	31	1,535	(*)	----	31	1,502	1.3	64	31	1,448	−5.1	59	31	1,528	−3.4	66	31	1,474	−1.1	54
800	31	1,970	−3.4	60	31	2,006	4.3	38	31	2,022	.0	55	31	1,990	.7	60	31	1,923	−6.7	59	31	2,008	−3.7	60	31	1,955	−4.2	56
750	31	2,485	−5.1	57	31	2,538	2.2	36	31	2,543	−1.4	48	31	2,515	−.8	54	31	2,430	−9.3	57	31	2,521	−5.3	61	31	2,465	−7.2	58
700	31	3,017	−7.8	58	31	3,083	−.6	34	31	3,084	−4.7	50	31	3,056	−3.0	43	31	2,955	−12.2	57	31	3,056	−7.5	62	31	2,995	−10.4	58
650	31	3,597	−10.5	60	31	3,675	−3.7	32	31	3,668	−7.5	50	31	3,645	−5.9	38	31	3,524	−15.8	54	31	3,633	−10.4	63	31	3,567	−13.8	57
600	31	4,202	−13.9	61	31	4,300	−7.8	33	31	4,284	−10.4	43	31	4,263	−9.6	----	31	4,117	−19.6	53	31	4,242	−13.8	61	31	4,166	−17.5	55
550	31	4,860	−17.9	62	31	4,972	−12.5	34	31	4,950	−14.2	44	31	4,935	−13.7	----	31	4,762	−23.4	----	31	4,902	−17.4	60	31	4,811	−22.0	----
500	31	5,564	−22.8	----	31	5,691	−17.6	----	31	5,666	−18.8	----	31	5,649	−18.6	----	31	5,449	−27.8	----	31	5,606	−22.1	----	31	5,506	−26.8	----
450	31	6,339	−27.7	----	31	6,477	−23.5	----	31	6,449	−24.2	----	31	6,432	−24.6	----	31	6,205	−32.9	----	30	6,381	−27.3	----	31	6,261	−31.7	----
400	31	7,165	−33.6	----	31	7,322	−29.7	----	30	7,294	−30.4	----	31	7,273	−31.2	----	31	7,017	−38.8	----	30	7,214	−33.1	----	31	7,082	−37.2	----
350	31	8,088	−40.5	----	30	8,261	−36.8	----	30	8,228	−37.8	----	31	8,205	−38.4	----	31	7,920	−45.3	----	29	8,138	−40.0	----	31	7,992	−43.3	----
300	28	9,131	−47.4	----	29	9,315	−44.8	----	30	9,271	−46.1	----	31	9,248	−45.6	----	29	8,935	−50.9	----	28	9,183	−47.5	----	31	9,015	−49.4	----
250	25	10,330	−52.2	----	19	10,514	−51.7	----	26	10,465	−53.1	----	29	10,446	−52.1	----	26	10,130	−54.1	----	25	10,375	−53.2	----	30	10,200	−54.6	----
200	18	11,824	−52.3	----	14	11,944	−55.6	----	16	11,911	−55.7	----	23	11,912	−54.2	----	18	11,572	−52.0	----	21	11,826	−54.3	----	25	11,618	−54.5	----
175	14	12,707	−53.1	----	9	12,827	−57.8	----	12	12,748	−56.5	----	15	12,763	−55.6	----	16	12,426	−50.9	----	17	12,695	−55.2	----	14	12,478	−50.0	----
150	8	13,722	−56.4	----	7	13,822	−60.2	----	----	----	----	----	7	13,805	−57.9	----	11	13,436	−50.9	----	12	13,667	−56.8	----	9	13,512	−52.1	----
125	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	5	14,681	−52.3	----	6	14,803	−58.3	----	5	14,692	−53.4	----

See footnotes at end of table.

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during January 1948*—Continued

Standard pressure surface (mb.)	Greensboro, N. C. (987.9 mb.)				Hatteras, N. C. (1,019.6 mb.)				Havana, Cuba [1] (—— mb.)				Honolulu, T. H. (1,012.9 mb.)				Huntington, W. Va. (1,001.0 mb.)				International Falls, Minn. (976.8 mb.)				Joliet, Ill. (999.0 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	273	0.3	67	31	3	5.3	77	----	----	----	----	31	3	23.1	68	31	172	−3.2	73	31	360	−17.1	86	31	178	−7.9	75
1,000	31	173	(*)	----	31	161	5.1	73	----	----	----	----	31	115	21.6	69	31	178	(*)	----	31	182	(*)	----	31	171	(*)	----
950	31	586	.6	60	31	583	3.8	66	----	----	----	----	31	562	17.8	74	31	589	−4.8	71	31	571	−15.3	84	31	572	−9.1	74
900	31	1,017	−2.6	60	31	1,017	2.7	61	----	----	----	----	31	1,018	14.4	78	31	1,008	−6.6	73	31	977	−14.6	78	31	985	−10.1	73
850	31	1,470	−2.9	58	31	1,479	1.7	53	----	----	----	----	31	1,499	11.6	77	31	1,453	−7.6	70	31	1,411	−13.9	67	31	1,425	−10.1	65
800	31	1,950	−2.9	52	31	1,966	.2	55	----	----	----	----	31	2,005	9.8	57	31	1,924	−8.2	63	31	1,871	−14.1	57	31	1,892	−10.7	59
750	31	2,466	−4.3	51	31	2,486	−1.5	52	----	----	----	----	31	2,548	8.5	43	31	2,432	−9.1	62	31	2,365	−15.7	53	31	2,391	−12.1	54
700	31	3,002	−6.6	53	31	3,030	−3.9	54	----	----	----	----	31	3,107	5.5	36	31	2,957	−11.2	59	31	2,878	−18.0	56	31	2,912	−14.2	52
650	30	3,580	−9.1	48	30	3,616	−7.2	53	----	----	----	----	31	3,714	2.1	36	31	3,533	−13.3	58	31	3,432	−20.9	----	31	3,477	−16.8	49
600	30	4,193	−12.7	51	29	4,232	−10.3	49	----	----	----	----	31	4,351	−1.7	37	31	4,129	−16.2	62	31	4,016	−24.4	----	31	4,069	−19.8	51
550	30	4,853	−16.7	56	29	4,901	−14.0	48	----	----	----	----	31	5,039	−6.0	37	31	4,781	−20.1	60	31	4,649	−27.9	----	31	4,715	−23.0	----
500	30	5,562	−21.0	----	29	5,614	−18.7	48	----	----	----	----	31	5,777	−11.0	----	31	5,479	−24.6	----	31	5,324	−32.3	----	31	5,402	−27.7	----
450	30	6,339	−26.3	----	29	6,398	−24.0	----	----	----	----	----	31	6,586	−16.8	----	30	6,241	−29.6	----	31	6,063	−37.3	----	30	6,160	−32.4	----
400	30	7,176	−31.8	----	29	7,241	−29.8	----	----	----	----	----	31	7,452	−23.5	----	30	7,067	−34.9	----	31	6,864	−42.8	----	30	6,977	−37.8	----
350	28	8,111	−38.0	----	29	8,180	−35.9	----	----	----	----	----	31	8,415	−29.7	----	29	7,990	−40.9	----	30	7,763	−47.8	----	30	7,885	−43.4	----
300	24	9,156	−45.1	----	29	9,234	−43.0	----	----	----	----	----	31	9,499	−35.8	----	25	9,023	−47.0	----	28	8,757	−51.6	----	29	8,922	−49.0	----
250	18	10,343	−53.0	----	26	10,442	−51.1	----	----	----	----	----	30	10,743	−42.8	----	24	10,213	−51.9	----	25	9,958	−52.2	----	26	10,131	−52.2	----
200	14	11,756	−54.7	----	18	11,861	−54.8	----	----	----	----	----	30	12,220	−51.4	----	21	11,637	−52.5	----	23	11,397	−49.9	----	18	11,573	−51.2	----
175	9	12,642	−54.9	----	10	12,711	−54.7	----	----	----	----	----	29	13,075	−56.2	----	19	12,497	−53.2	----	16	12,264	−49.3	----	11	12,452	−51.3	----
150	----	----	----	----	9	13,693	−55.8	----	----	----	----	----	29	14,042	−61.6	----	19	13,490	−54.7	----	13	13,282	−49.7	----	8	13,407	−51.8	----
125	----	----	----	----	----	----	----	----	----	----	----	----	28	15,155	−67.1	----	14	14,633	−56.2	----	5	14,589	−50.8	----	----	----	----	----
100	----	----	----	----	----	----	----	----	----	----	----	----	24	16,500	−71.5	----	----	----	----	----	----	----	----	----	----	----	----	----
80	----	----	----	----	----	----	----	----	----	----	----	----	22	17,817	−70.8	----	----	----	----	----	----	----	----	----	----	----	----	----
60	----	----	----	----	----	----	----	----	----	----	----	----	15	19,535	−66.0	----	----	----	----	----	----	----	----	----	----	----	----	----
50	----	----	----	----	----	----	----	----	----	----	----	----	9	20,634	−63.9	----	----	----	----	----	----	----	----	----	----	----	----	----
40	----	----	----	----	----	----	----	----	----	----	----	----	7	22,002	−61.6	----	----	----	----	----	----	----	----	----	----	----	----	----

Standard pressure surface (mb.)	Lake Charles, La. (1,021.4 mb.)				Lander, Wyo. (829.9 mb.)				Las Vegas, Nev. (952.3 mb.)				Little Rock, Ark. (1,013.1 mb.)				Mazatlan, Mexico (1,010.9 mb.)				Medford, Oreg. (974.7 mb.)				Merida, Mexico (1,013.6 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	5	6.6	84	31	1,696	−6.5	69	31	574	7.5	37	31	79	1.6	69	31	14	21.0	75	31	401	2.9	82	31	27	22.7	78
1,000	31	178	7.2	77	31	209	(*)	----	31	165	(*)	----	31	183	1.3	64	31	108	20.4	70	31	193	(*)	----	31	146	22.0	78
950	31	606	6.4	71	31	626	(*)	----	31	592	(*)	----	31	599	.4	61	31	558	20.6	46	31	614	5.4	73	31	591	19.4	78
900	31	1,044	6.9	66	31	1,057	(*)	----	31	1,043	9.9	25	31	1,028	−1.1	63	31	1,017	18.6	38	31	1,052	5.5	57	31	1,053	16.8	78
850	31	1,514	5.8	63	31	1,506	(*)	----	31	1,515	7.0	28	31	1,484	−.9	60	31	1,505	15.5	33	31	1,517	3.4	52	31	1,539	13.8	77
800	31	2,009	4.4	57	31	1,983	−4.2	61	31	2,011	4.8	28	31	1,968	−1.7	62	31	2,015	11.8	36	31	2,007	1.5	44	31	2,048	11.4	68
750	31	2,538	2.4	53	31	2,496	−5.9	53	31	2,540	2.3	28	31	2,485	−3.0	59	31	2,554	8.0	38	31	2,527	−.9	39	31	2,589	9.3	54
700	31	3,088	−.4	53	31	3,030	−8.6	53	31	3,089	−.8	29	31	3,025	−5.4	56	30	3,118	4.0	39	31	3,073	−3.2	40	31	3,155	6.5	44
650	31	3,679	−3.5	47	31	3,602	−12.1	54	31	3,678	−3.8	26	30	3,609	−8.3	58	30	3,715	−0.2	42	31	3,658	−6.3	39	31	3,763	3.0	43
600	31	4,306	−7.3	39	31	4,208	−15.8	58	31	4,306	−7.8	----	30	4,224	−11.6	57	29	4,353	−4.3	38	30	4,278	−10.1	39	30	4,405	−.2	34
550	31	4,980	−11.4	----	31	4,862	−19.6	58	31	4,975	−12.1	----	30	4,887	−15.6	49	29	5,032	−8.6	----	30	4,942	−14.4	41	30	5,093	−4.5	28
500	31	5,702	−16.3	----	31	5,561	−24.4	----	31	5,699	−17.0	----	30	5,598	−20.3	50	29	5,767	−13.5	----	30	5,659	−19.2	----	29	5,839	−9.8	28
450	31	6,494	−21.8	----	31	6,327	−29.5	----	31	6,485	−22.9	----	30	6,373	−25.6	----	29	6,566	−18.9	----	30	6,435	−24.9	----	29	6,652	−15.4	----
400	31	7,343	−28.3	----	31	7,151	−35.1	----	31	7,333	−29.8	----	29	7,212	−31.7	----	29	7,427	−25.3	----	30	7,280	−31.4	----	29	7,526	−22.0	----
350	31	8,287	−35.3	----	31	8,070	−41.4	----	31	8,270	−37.4	----	27	8,143	−38.6	----	29	8,382	−32.5	----	30	8,211	−38.6	----	29	8,493	−29.5	----
300	30	9,346	−43.4	----	31	9,100	−48.4	----	31	9,316	−45.5	----	18	9,159	−46.2	----	29	9,451	−40.8	----	30	9,251	−46.8	----	28	9,575	−38.2	----
250	28	10,547	−51.7	----	30	10,279	−54.7	----	31	10,511	−53.0	----	12	10,324	−51.1	----	26	10,674	−49.7	----	29	10,436	−53.7	----	24	10,806	−47.8	----
200	27	11,987	−55.7	----	22	11,712	−54.2	----	30	11,934	−56.3	----	----	----	----	----	22	12,113	−56.8	----	26	11,853	−56.9	----	----	----	----	----
175	20	12,839	−57.0	----	17	12,578	−53.9	----	30	12,780	−57.4	----	----	----	----	----	18	12,967	−60.0	----	18	12,765	−55.6	----	----	----	----	----
150	15	13,844	−60.7	----	10	13,566	−55.4	----	23	13,752	−58.6	----	----	----	----	----	11	13,915	−62.0	----	14	13,670	−57.5	----	----	----	----	----
125	7	14,982	−64.3	----	----	----	----	----	15	14,912	−62.2	----	----	----	----	----	----	----	----	----	5	14,864	−61.4	----	----	----	----	----

Standard pressure surface (mb.)	Miami, Fla. (1,018.7 mb.)				Nantucket, Mass. (1,015.1 mb.)				Nashville, Tenn. (1,000.4 mb.)				New Orleans, La. (1,021.3 mb.)				North Platte, Nebr. (920.5 mb.)				Oakland, Calif. (1,019.5 mb.)				Ogden, Utah (869.5 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	4	17.8	85	31	14	−2.0	80	31	180	−1.3	72	31	2	7.6	80	31	849	−4.6	73	31	6	11.1	73	31	1,355	−1.8	72
1,000	31	163	18.0	82	31	132	−2.8	78	31	182	(*)	----	31	176	8.2	75	31	187	(*)	----	31	167	12.6	59	31	224	(*)	----
950	31	602	16.0	79	31	538	−4.7	78	31	590	−3.1	70	31	605	7.5	70	31	601	(*)	----	31	599	11.5	49	31	646	(*)	----
900	31	1,060	13.6	73	31	962	−6.2	72	31	1,017	−3.7	66	31	1,044	7.5	60	31	1,025	−3.2	65	31	1,048	10.2	42	31	1,079	(*)	----
850	31	1,540	11.4	68	31	1,408	−7.1	62	31	1,468	−4.1	63	31	1,514	6.7	54	31	1,477	−4.2	58	31	1,521	8.3	39	31	1,535	−1.0	63
800	31	2,045	9.5	57	31	1,880	−8.1	54	31	1,945	−4.8	59	31	2,011	5.3	50	31	1,953	−5.9	59	31	2,020	6.3	----	31	2,018	−3.0	56
750	31	2,584	7.7	44	31	2,385	−9.6	53	31	2,458	−5.8	59	31	2,542	2.9	51	31	2,461	−8.4	61	31	2,553	4.1	----	31	2,532	−5.9	60
700	31	3,145	5.1	40	31	2,911	−11.3	52	31	2,991	−7.7	56	31	3,093	.2	53	31	2,989	−11.3	59	31	3,105	1.3	----	31	3,064	−8.5	62
650	30	3,746	1.5	40	31	3,481	−13.9	51	30	3,569	−10.3	55	31	3,688	−2.8	50	31	3,560	−14.4	56	30	3,700	−2.6	----	31	3,640	−11.1	63
600	30	4,387	−2.3	38	31	4,081	−16.8	53	29	4,177	−13.4	55	30	4,320	−5.9	46	31	4,156	−17.9	57	30	4,327	−6.9	----	31	4,247	−14.4	61
550	30	5,072	−6.4	34	31	4,729	−20.5	54	29	4,837	−17.5	56	30	4,997	−10.0	46	31	4,805	−21.8	----	30	5,003	−11.6	----	31	4,905	−17.9	57
500	30	5,812	−11.4	35	31	5,428	−25.0	----	29	5,543	−21.5	----	30	5,725	−14.9	45	31	5,498	−26.2	----	30	5,725	−16.5	----	31	5,609	−22.4	----
450	29	6,616	−17.2	38	31	6,186	−29.7	----	29	6,316	−26.9	----	29	6,527	−20.2	----	31	6,259	−31.3	----	29	6,518	−22.1	----	31	6,384	−27.3	----
400	29	7,483	−23.4	----	31	7,016	−35.4	----	29	7,151	−32.9	----	29	7,380	−26.8	----	31	7,075	−37.2	----	29	7,366	−28.9	----	30	7,223	−32.8	----
350	29	8,445	−30.8	----	31	7,932	−41.8	----	26	8,085	−39.4	----	28	8,331	−33.7	----	31	7,986	−43.3	----	28	8,309	−36.2	----	30	8,149	−39.8	----
300	27	9,521	−38.7	----	26	8,959	−48.6	----	24	9,131	−46.3	----	28	9,394	−41.6	----	31	9,009	−49.1	----	27	9,358	−44.7	----	30	9,185	−47.6	----
250	25	10,749	−48.0	----	21	10,149	−53.2	----	18	10,343	−52.9	----	27	10,604	−50.5	----	28	10,209	−52.8	----	27	10,555	−52.9	----	24	10,368	−54.2	----
200	20	12,198	−57.0	----	11	11,576	−51.8	----	14	11,759	−53.8	----	25	12,039	−55.7	----	24	11,667	−52.8	----	21	11,986	−54.8	----	17	11,791	−55.3	----
175	13	13,051	−60.1	----	----	----	----	----	7	12,647	−55.4	----	17	12,906	−57.1	----	17	12,541	−51.0	----	18	12,841	−55.1	----	13	12,628	−53.2	----
150	6	14,027	−64.4	----	----	----	----	----	5	13,600	−58.1	----	15	13,864	−60.0	----	14	13,506	−52.9	----	15	13,805	−57.7	----	6	13,672	−54.8	----
125	----	----	----	----	----	----	----	----	----	----	----	----	12	14,992	−63.5	----	6	14,709	−55.7	----	7	14,948	−60.5	----	----	----	----	----

See footnotes at end of table.

TABLE 1.—*Mean dynamic height (geopotential) in units of 0.98 dynamic meters, temperature in degrees centigrade, and relative humidity in percent, for standard pressures, as obtained by radiosondes during January 1948*—Continued

Standard pressure surface (mb.)	Oklahoma City, Okla. (975.8 mb.)				Omaha, Nebr. (985.5 mb.)				Phoenix, Ariz. (977.0 mb.)				Pittsburgh, Pa. (973.9 mb.)				Portland, Maine (1,014.5 mb.)				Rapid City, S. Dak. (903.9 mb.)				St. Cloud, Minn. (981.6 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	391	−1.1	73	31	308	−5.8	68	31	339	11.1	41	30	382	−5.8	73	31	20	−8.9	76	31	980	−5.4	69	31	317	−14.8	85
1,000	31	193	(*)	----	31	192	(*)	----	31	143	(*)	----	30	172	(*)	----	31	132	−8.7	72	31	173	(*)	----	31	174	(*)	----
950	31	605	−.1	65	31	596	−7.5	71	31	583	14.9	30	30	580	−7.5	73	31	533	−9.5	73	31	588	(*)	----	31	571	−13.9	85
900	31	1,036	−1.8	61	31	1,014	−7.1	60	31	1,031	12.4	29	30	995	−8.9	74	31	946	−10.5	74	31	1,014	(*)	----	31	975	−13.0	75
850	31	1,491	−1.7	59	31	1,460	−7.1	50	31	1,507	9.3	30	30	1,437	−10.3	72	31	1,385	−11.5	66	31	1,465	−2.9	54	31	1,413	−12.0	60
800	31	1,973	−2.3	58	31	1,931	−8.3	50	31	2,007	6.4	32	30	1,903	−11.2	65	31	1,848	−13.0	62	31	1,943	−5.6	54	31	1,875	−12.6	56
750	31	2,490	−3.8	59	31	2,437	−10.5	52	31	2,540	3.3	33	30	2,407	−12.2	62	31	2,343	−14.4	58	31	2,453	−8.6	54	31	2,376	−13.8	53
700	31	3,027	−5.8	58	31	2,959	−12.9	53	31	3,090	.2	33	30	2,923	−14.0	57	31	2,860	−15.9	55	31	2,978	−11.7	52	31	2,890	−15.8	49
650	31	3,608	−8.4	56	31	3,529	−15.9	54	31	3,687	−2.8	29	30	3,492	−16.3	55	30	3,418	−18.0	55	31	3,547	−14.9	51	31	3,451	−19.0	53
600	31	4,222	−11.9	48	30	4,120	−18.9	59	31	4,311	−6.9	30	30	4,083	−18.8	59	30	4,008	−20.9	----	31	4,145	−18.5	49	31	4,037	−22.5	----
550	30	4,881	−15.9	44	30	4,766	−22.5	----	31	4,988	−11.6	----	30	4,732	−22.1	----	30	4,648	−24.7	----	31	4,793	−22.2	----	31	4,674	−26.2	----
500	28	5,588	−21.4	----	30	5,458	−27.2	----	31	5,708	−17.0	----	30	5,422	−26.2	----	29	5,339	−28.7	----	31	5,483	−26.4	----	31	5,355	−30.4	----
450	26	6,355	−26.8	----	30	6,216	−32.4	----	31	6,500	−22.9	----	30	6,183	−31.3	----	29	6,090	−33.7	----	31	6,244	−31.6	----	31	6,103	−35.2	----
400	26	7,191	−32.7	----	30	7,033	−38.2	----	31	7,344	−29.2	----	30	7,001	−36.7	----	27	6,911	−38.6	----	31	7,062	−37.5	----	31	6,909	−40.6	----
350	26	8,118	−39.3	----	30	7,940	−43.8	----	30	8,294	−36.7	----	30	7,913	−42.8	----	27	7,817	−44.3	----	30	7,975	−44.0	----	31	7,808	−46.1	----
300	22	9,174	−45.6	----	30	8,962	−49.4	----	29	9,342	−44.9	----	29	8,941	−48.4	----	25	8,836	−49.7	----	28	8,985	−49.7	----	30	8,826	−50.6	----
250	12	10,330	−52.3	----	30	10,147	−52.5	----	26	10,533	−51.4	----	25	10,117	−52.1	----	21	10,002	−52.3	----	23	10,138	−52.3	----	28	10,009	−52.0	----
200	5	11,816	−54.6	----	22	11,623	−51.2	----	23	11,961	−55.6	----	17	11,573	−53.0	----	16	11,405	−50.7	----	22	11,583	−51.0	----	23	11,458	−49.7	----
175	----	----	----	----	9	12,531	−50.1	----	23	12,810	−56.7	----	14	12,432	−53.4	----	11	12,284	−50.7	----	18	12,448	−50.3	----	16	12,351	−50.1	----
150	----	----	----	----	6	13,599	−52.7	----	16	13,782	−59.2	----	8	13,427	−55.7	----	6	13,281	−49.9	----	9	13,436	−49.5	----	5	13,488	−48.9	----
125	----	----	----	----	----	----	----	----	7	14,890	−63.5	----	----	----	----	----	----	----	----	----	6	14,595	−50.2	----	----	----	----	----

Standard pressure surface (mb.)	San Antonio, Tex. (992.6 mb.)				San Juan, P. R. (1,015.3 mb.)				Santa Maria, Calif. (1,010.5 mb.)				Sault Ste. Marie, Mich. (990.0 mb.)				Spokane, Wash. (937.6 mb.)				Swan Island, W. I. (1,014.5 mb.)				Tacubaya, Mexico (774.0 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	240	6.7	73	31	15	24.0	80	31	71	10.5	73	31	221	−10.9	82	31	721	−2.0	81	24	10	24.6	83	31	2,306	13.1	56
1,000	31	178	(*)	----	31	148	22.9	81	31	158	11.3	68	31	142	(*)	----	31	204	(*)	----	24	137	24.0	81	31	88	(*)	----
950	31	605	7.3	70	31	594	19.6	84	31	589	12.9	46	31	539	−11.2	80	31	621	(*)	----	24	592	20.6	84	31	543	(*)	----
900	31	1,045	6.2	72	31	1,058	16.4	83	31	1,041	12.2	36	31	949	−13.3	80	31	1,045	−2.9	77	24	1,051	17.3	82	31	1,013	(*)	----
850	31	1,513	5.4	67	31	1,543	13.5	79	31	1,517	9.9	33	31	1,383	−14.6	77	31	1,498	−3.4	69	24	1,537	14.2	80	31	1,505	(*)	----
800	31	2,008	4.7	55	31	2,052	11.5	64	31	2,018	7.7	----	31	1,841	−16.3	68	31	1,976	−5.5	65	24	2,048	11.5	71	31	2,025	(*)	----
750	31	2,538	3.3	43	31	2,596	9.3	46	31	2,554	5.4	----	31	2,335	−17.5	60	31	2,485	−7.4	64	24	2,601	9.4	56	31	2,572	11.3	57
700	31	3,090	.8	39	31	3,159	7.2	35	31	3,108	2.2	----	31	2,840	−19.1	60	31	3,015	−10.1	59	23	3,156	6.4	51	31	3,142	6.9	62
650	30	3,683	−2.3	29	31	3,771	4.4	----	31	3,704	−1.8	----	31	3,395	−22.0	----	31	3,591	−13.1	59	23	3,769	3.2	46	31	3,745	2.2	70
600	30	4,312	−6.0	----	30	4,413	1.3	----	31	4,334	−6.0	----	31	3,973	−25.3	----	31	4,189	−16.4	63	23	4,405	−.7	----	31	4,390	−2.5	71
550	28	4,985	−10.8	----	30	5,108	−2.8	----	31	5,011	−10.7	----	30	4,600	−29.1	----	31	4,843	−19.8	63	23	5,102	−4.4	----	31	5,074	−6.8	64
500	28	5,708	−16.1	----	30	5,856	−7.5	----	31	5,735	−15.8	----	29	5,270	−33.2	----	31	5,541	−23.8	----	23	5,840	−9.3	----	31	5,813	−11.3	56
450	28	6,500	−21.9	----	29	6,677	−13.0	----	31	6,526	−21.6	----	28	6,017	−37.1	----	31	6,310	−29.0	----	23	6,664	−14.8	----	31	6,622	−16.6	46
400	28	7,349	−28.5	----	29	7,555	−19.4	----	31	7,378	−28.1	----	28	6,817	−42.4	----	31	7,135	−34.6	----	22	7,529	−21.2	----	31	7,490	−23.1	----
350	27	8,287	−35.8	----	29	8,533	−26.8	----	31	8,322	−35.4	----	23	7,741	−46.4	----	31	8,055	−41.0	----	22	8,499	−28.6	----	30	8,452	−30.6	----
300	26	9,339	−43.7	----	29	9,626	−35.4	----	31	9,376	−43.6	----	14	8,801	−49.2	----	29	9,089	−48.7	----	22	9,584	−37.2	----	28	9,527	−39.3	----
250	18	10,532	−50.4	----	29	10,869	−44.9	----	27	10,578	−52.6	----	----	----	----	----	26	10,277	−55.0	----	21	10,819	−46.8	----	10	10,758	−47.9	----
200	7	11,956	−57.8	----	29	12,327	−54.9	----	22	11,991	−56.6	----	----	----	----	----	11	11,683	−54.1	----	21	12,266	−56.4	----	----	----	----	----
175	5	12,851	−57.0	----	27	13,170	−59.9	----	17	12,836	−57.1	----	----	----	----	----	5	12,470	−53.4	----	20	13,105	−61.3	----	----	----	----	----
150	----	----	----	----	16	14,121	−65.0	----	13	13,811	−58.8	----	----	----	----	----	----	----	----	----	15	14,054	−66.7	----	----	----	----	----
125	----	----	----	----	5	15,217	−69.1	----	7	14,966	−61.6	----	----	----	----	----	----	----	----	----	7	15,132	−74.2	----	----	----	----	----

Standard pressure surface (mb.)	Tampa, Fla. (1,018.9 mb.)				Tatoosh Island, Wash. (1,017.1 mb.)				Toledo, Ohio (997.4 mb.)				Washington, D. C. (1,018.5 mb.)			
	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity	Number of observations	Dynamic height	Temperature	Relative humidity
Surface	31	9	13.2	83	31	31	5.8	84	30	191	−7.3	76	31	25	−1.7	68
1,000	31	166	14.0	79	31	169	5.2	77	30	170	(*)	----	31	170	−2.2	61
950	31	601	12.8	72	31	591	4.2	70	30	572	−8.8	80	31	580	−3.3	60
900	31	1,052	11.2	66	31	1,027	1.9	66	30	986	−10.6	78	31	1,003	−4.9	62
850	31	1,528	9.4	57	31	1,486	.2	60	30	1,425	−11.1	69	31	1,452	−5.7	58
800	31	2,030	8.1	51	31	1,970	−1.8	53	30	1,891	−11.8	56	31	1,926	−6.7	59
750	30	2,568	5.7	45	31	2,485	−4.7	53	30	2,389	−13.5	52	31	2,434	−8.0	55
700	30	3,122	2.7	44	31	3,022	−7.2	53	30	2,906	−15.4	50	31	2,963	−10.1	54
650	30	3,719	−.3	38	31	3,598	−10.6	58	30	3,468	−18.4	54	31	3,535	−12.2	51
600	30	4,355	−3.8	37	31	4,207	−14.1	59	30	4,056	−21.2	----	31	4,140	−15.4	53
550	29	5,033	−7.9	----	31	4,861	−17.9	58	30	4,698	−24.5	----	31	4,791	−19.1	52
500	29	5,770	−12.8	----	31	5,569	−22.6	----	29	5,384	−28.4	----	30	5,494	−23.5	----
450	29	6,566	−18.5	----	31	6,336	−27.7	----	29	6,137	−33.1	----	29	6,260	−28.6	----
400	29	7,434	−24.9	----	31	7,172	−33.7	----	29	6,951	−38.6	----	29	7,090	−34.1	----
350	29	8,390	−32.1	----	30	8,102	−40.1	----	29	7,857	−44.2	----	27	8,018	−40.2	----
300	29	9,458	−40.4	----	30	9,138	−46.8	----	28	8,868	−49.9	----	27	9,052	−47.5	----
250	28	10,672	−49.1	----	29	10,338	−53.1	----	22	10,031	−52.3	----	24	10,227	−52.4	----
200	23	12,105	−56.4	----	23	11,785	−53.9	----	14	11,464	−50.2	----	22	11,650	−53.9	----
175	19	12,954	−59.8	----	19	12,645	−53.1	----	10	12,380	−51.3	----	21	12,502	−54.1	----
150	17	13,900	−62.5	----	14	13,657	−53.9	----	----	----	----	----	19	13,475	−53.9	----
125	10	15,020	−67.0	----	9	14,851	−56.4	----	----	----	----	----	14	14,621	−55.5	----
100	----	----	----	----	5	16,351	−59.8	----	----	----	----	----	9	16,036	−57.3	----

[1] Data not yet received.

*Temperature and relative humidity data for this level are not available or are available only for certain days. See note entitled "Change in Summarization of Radiosonde Data," p. 6, in the January 1946 issue of the MONTHLY WEATHER REVIEW.

NOTE.—All observations scheduled between 0300 and 0500, G. C. T., except at Ciudad Victoria, Mazatlan, and Merida, where they are taken near 0200, G. C. T. "Number of observations" refers to those of dynamic height only. (In a few cases temperature or humidity data may be missing for one or more standard pressure surfaces of some observations.) Relative humidity data are not published for standard pressure surfaces having a corresponding mean temperature below −20° C.

All relative humidity observations are obtained by electric hygrometer and have been adjusted to compensate for the values occurring below the operating range of the humidity element. For explanation of the adjustment see article entitled "Curve Method for Obtaining Monthly Means of Relative Humidity," p. 241, MONTHLY WEATHER REVIEW, December 1944.

None of the means included in these tables are based on less than 15 observations at the surface or 5 observations at a standard pressure level.

TABLE 2.—*Free-air resultant winds based on pilot balloon observations made near 5 p. m., E. S. T. (2200 G. C. T.) during January 1948. Directions given in degrees from north (N.=360°, E.=90°, S.=180°, W.=270°). Speeds in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (534 m.)			Albuquerque, N.Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (868 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (100 m.)			Charleston, S. C. (16 m.)			Cincinnati, Ohio (273 m.)			Denver, Colo. (1,618 m.)			El Paso, Tex. (1,198 m.)		
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed
Surface	29	9	0.2	31	158	0.9	26	309	2.6	31	273	5.8	30	300	2.4	28	341	0.8	26	105	2.4	25	250	4.6	29	259	0.4	25	308	0.9	31	269	2.4	27	328	1.4	31	248	0.7
500							26	298	3.1										26	118	2.5	25	255	6.0	29	254	2.2	25	272	2.8	31	263	3.3						
1,000	29	287	.6				25	287	4.5				29	292	7.5	28	333	.2	23	179	2.5	17	275	7.6	28	277	4.2	22	276	6.0	25	265	4.3						
1,500	26	267	2.8				20	287	9.1	31	273	8.7	27	301	10.1	28	276	1.8	21	222	3.2	13	285	8.9	20	285	7.9	21	277	9.2	20	282	7.6				31	259	.9
2,000	25	278	7.6	31	224	.3	20	283	12.0	31	283	9.9	21	303	9.9	27	301	3.9	19	258	4.6	11	288	10.9	14	304	10.9	20	280	11.9	16	279	10.6	27	306	4.0	31	274	1.9
2,500	23	283	11.2	31	302	4.7	19	284	14.4	27	284	12.4	18	305	11.1	27	306	5.4	18	271	6.7				12	304	12.8	20	277	14.1	16	277	12.9	27	302	5.8	31	280	4.8
3,000	22	284	12.5	30	302	9.5	19	271	16.2	26	296	13.0	17	306	12.0	25	308	7.9	18	269	8.3							19	274	16.0	14	277	17.6	26	295	6.9	30	286	7.8
4,000	22	274	13.3	29	295	13.5	15	279	21.2	23	304	15.5	14	316	15.2	22	318	9.7	18	275	7.9							16	269	20.7	12	277	23.1	23	309	11.2	29	289	10.9
5,000	20	291	16.2	28	285	15.1	13	279	25.8	19	311	18.7	12	316	17.3	17	311	13.6	15	262	9.9							13	269	23.9	11	270	29.4	21	309	16.8	28	293	11.6
6,000	20	288	17.6	28	290	17.9	11	287	27.7	12	311	18.4	12	319	18.3	15	317	14.4	14	262	12.1													19	306	16.3	28	295	12.8
8,000	16	285	20.1	24	298	19.2										13	321	16.7	12	254	17.3													13	303	15.1	25	293	12.6
10,000				19	295	21.5																														22	305	15.3
12,000				16	278	23.1																														18	286	16.9
14,000																																				16	290	17.8
16,000																																				10	284	16.4

	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,475 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las Vegas, Nev. (575 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (416 m.)			Miami, Fla. (12 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed
Surface	30	350	2.9	30	296	0.7	25	292	1.7	28	258	4.3	26	356	1.2	30	274	3.0	31	20	1.7	30	322	1.4	28	157	0.5	30	120	0.5	27	336	2.0	29	310	1.5	28	311	4.8
500							25	274	3.1				26	296	2.5	30	268	4.5				30	295	2.5	28	145	.6	30	142	.6	26	326	2.9	29	295	2.8	28	295	6.2
1,000							25	266	6.4	28	258	7.3	23	270	5.0	26	270	6.8	31	29	2.8	28	316	3.7	28	143	1.5	29	142	1.8	22	320	3.8	25	277	4.8	24	307	8.8
1,500				30	294	.7	24	278	8.4	28	277	10.3	22	273	7.8	22	280	8.9	31	10	2.9	23	299	6.4	26	184	1.3	28	251	2.8	22	301	5.7	23	282	7.0	23	302	11.1
2,000	30	344	2.9	30	305	1.5	22	284	11.0	27	290	11.6	21	278	9.6	21	282	10.2	31	340	3.3	22	288	10.5	23	115	.2	24	258	4.5	22	292	9.3	20	292	10.1	21	290	12.5
2,500	30	336	2.6	30	288	2.2	16	284	14.5	23	297	13.7	20	276	11.8	21	284	11.9	31	327	4.2	18	291	12.4	21	2	2.4	18	255	4.3	20	285	12.1	20	287	12.3	15	285	11.7
3,000	30	317	4.5	29	296	4.6	16	284	16.3	20	303	14.7	18	282	13.6	20	287	13.6	31	322	5.6	17	297	14.5	21	344	5.1	16	275	5.0	19	281	13.4	16	294	15.5	11	268	13.7
4,000	29	320	10.0	26	303	8.9	14	282	21.5	15	310	15.2	15	281	18.0	11	292	14.6	30	325	9.3	13	295	19.0	17	326	6.8	16	264	7.7	17	268	17.8	14	294	19.1			
5,000	28	320	15.3	24	312	13.3	13	281	25.8	11	298	16.5	12	276	17.3				28	322	11.0	10	298	23.1	10	314	5.7	14	259	11.4	15	270	19.6	10	295	24.9			
6,000	24	314	14.4	19	310	13.0							10	276	21.1				28	316	12.0							14	261	14.3									
8,000	20	303	17.4	15	312	17.3													22	312	17.4							12	257	22.5									
10,000	11	317	16.3	10	300	23.4													17	309	14.4																		
12,000																			11	319	14.2																		

	Oakland, Calif. (8 m.)			Oklahoma City, Okla. (396 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (13 m.)			Sault Ste. Marie, Mich. (225 m.)			Seattle, Wash. (116 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed
Surface	28	297	1.0	28	340	0.9	31	310	3.1	31	166	0.2	31	316	3.2	30	267	2.4	27	275	0.3	27	306	2.9	21	300	2.0	21	180	1.6	24	173	1.0	27	298	3.0
500	28	23	2.9	28	324	1.0	31	306	3.7	31	174	.3				30	269	3.8	27	270	.4	27	325	3.0	21	284	2.0	21	177	3.7				27	295	5.2
1,000	26	30	3.7	28	309	1.4	31	303	5.3	31	87	.1	31	317	3.4	27	272	5.9	25	256	1.7	27	348	2.9	16	289	1.7	18	197	4.8	24	209	2.4	26	294	7.9
1,500	24	12	3.6	26	312	4.3	29	312	7.9	31	346	.5	31	313	7.9	25	284	8.1	22	252	4.5	25	8	2.9	14	319	4.0	17	216	5.4	22	244	3.8	25	293	10.2
2,000	24	6	4.5	24	300	6.2	28	316	10.6	31	328	2.9	29	306	10.8	23	289	9.5	19	262	8.0	25	3	4.3	14	302	5.5	16	209	5.6	21	261	5.0	24	289	11.6
2,500	23	1	5.4	24	294	8.5	25	313	11.4	31	323	4.2	26	306	11.9	21	288	10.7	18	273	10.8	24	346	4.8	13	320	4.2	14	240	4.8	20	266	5.5	22	279	13.5
3,000	23	358	6.1	24	294	11.4	24	310	13.6	31	321	5.7	23	310	12.6	19	289	13.2	18	280	12.5	23	331	4.6	12	314	5.3	14	274	6.6	20	270	5.8	18	280	17.6
4,000	22	352	6.3	20	282	15.9	21	303	15.9	29	311	7.5	22	305	14.3	17	286	18.3	17	277	15.3	23	331	5.0				13	284	9.9	17	298	9.7	16	274	22.0
5,000	21	338	7.0	18	287	17.4	17	299	17.4	27	311	8.9	19	306	14.8	11	291	19.6	16	285	18.9	22	328	5.8				10	308	12.7	14	303	13.9	13	277	27.6
6,000	19	340	8.9	17	294	20.9	15	295	18.7	23	300	10.0	18	309	18.3				15	282	17.4	22	337	6.5												
8,000	13	340	8.7	10	300	21.5	13	289	29.5	16	303	10.8										16	335	9.0											

TABLE 3.—*Free-air resultant winds based on rawin observations made near 0300 G. C. T. during January 1948. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Speeds in meters per second*

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,636 m.)			Big Spring, Tex. (774 m.)			Bismarck, N. Dak. (505 m.)			Brownsville, Tex. (7 m.)			Caribou, Maine (191 m.)			Charleston, S. C. (13 m.)			Columbia, Mo. (239 m.)			Grand Junction, Colo.[1] (1,473 m.)			Hatteras, N. C. (3 m.)			International Falls, Minn. (360 m.)			Little Rock, Ark. (80 m.)			Miami, Fla. (12 m.)			Nantucket, Mass. (14 m.)		
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed
500	---	---	---	---	---	---	---	---	---	31	113	2.1	31	308	4.1	29	287	2.3	30	287	3.6	---	---	---	29	317	2.8	31	258	2.4	31	305	2.4	31	123	1.7	30	309	6.1
1,000	---	---	---	31	172	1.0	29	302	7.4	31	172	1.4	31	308	4.5	28	265	5.4	29	310	5.1	---	---	---	29	265	5.1	31	279	4.2	31	292	5.1	31	178	1.1	29	302	5.9
1,500	---	---	---	31	284	2.0	29	309	9.5	30	244	2.9	31	274	5.5	27	252	8.7	28	307	7.9	---	---	---	28	258	8.2	30	293	4.3	31	277	7.0	30	238	2.2	28	273	8.4
2,000	31	334	2.2	31	302	3.5	28	312	10.5	30	256	4.4	29	272	6.9	28	257	11.4	28	306	10.1	---	---	---	25	266	11.3	30	307	5.6	30	279	9.1	30	252	4.2	28	267	11.5
2,500	31	304	6.1	30	282	6.6	28	313	11.6	30	253	6.0	29	263	7.2	28	259	13.3	28	302	11.7	---	---	---	25	265	13.1	29	314	7.5	30	273	11.7	30	251	6.6	29	267	14.4
3,000	31	303	9.5	30	279	9.9	28	312	13.1	30	257	7.3	29	260	8.2	26	263	14.8	28	292	14.0	---	---	---	22	265	15.2	28	317	9.0	30	269	13.5	30	249	8.1	27	263	16.9
4,000	31	299	12.2	30	279	11.8	28	317	14.1	30	258	9.2	26	258	12.3	22	263	20.2	28	291	17.7	---	---	---	17	261	22.6	28	312	13.0	28	261	17.5	30	254	10.9	24	266	20.6
5,000	31	294	14.1	30	283	14.5	28	318	16.1	29	261	11.1	21	273	13.3	18	262	21.7	27	281	22.4	---	---	---	8	263	21.4	25	304	11.5	26	280	21.4	29	258	12.6	23	257	23.0
6,000	31	296	16.9	29	276	17.7	27	319	18.1	29	259	13.6	17	265	13.6	13	270	23.5	26	274	26.5	---	---	---	6	272	24.4	24	303	13.5	25	252	23.1	28	261	16.4	17	264	22.7
8,000	26	298	17.3	23	289	17.3	22	311	21.7	25	252	18.6	12	280	16.5	10	265	33.2	22	263	28.4	---	---	---	---	---	---	22	297	17.6	22	247	24.7	24	263	20.2	8	270	14.2
10,000	21	310	20.5	19	287	18.7	15	303	24.0	20	246	21.7	8	282	20.0	---	---	---	8	276	26.2	---	---	---	---	---	---	14	297	16.1	12	247	26.7	21	247	22.0	---	---	---
12,000	6	265	23.7	14	289	15.0	8	311	23.2	15	252	21.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	9	294	19.0	---	---	---	14	259	34.7	---	---	---

Altitude (meters) m. s. l.	Nashville, Tenn. (177 m.)			New Orleans, La. (6 m.)			Oakland, Calif. (31 m.)			Oklahoma City, Okla. (391 m.)			Rapid City, S. Dak. (980 m.)			San Antonio, Tex. (240 m.)			San Juan,[1] P. R. (28 m.)			Saint Cloud, Minn. (318 m.)			Santa Maria, Calif.[1] (72 m.)			Sault Ste. Marie, Mich. (224 m.)			Spokane, Wash. (721 m.)			Tatoosh Island, Wash. (33 m.)		
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed
500	29	266	1.7	30	37	1.1	31	10	1.7	31	20	1.5	---	---	---	31	44	2.1	---	---	---	30	275	2.4	---	---	---	30	300	1.4	---	---	---	30	182	1.9
1,000	29	273	3.8	28	277	1.6	31	4	2.6	31	343	2.3	31	298	4.4	30	204	1.0	---	---	---	30	289	5.7	---	---	---	30	272	3.9	31	201	3.1	30	239	3.5
1,500	29	283	7.9	27	275	4.6	31	338	2.8	31	327	4.2	31	308	8.5	29	237	3.8	---	---	---	30	298	7.5	---	---	---	28	295	6.4	30	242	4.1	29	249	4.4
2,000	29	277	10.6	27	275	7.4	31	326	3.0	31	315	5.6	31	315	11.6	29	260	6.6	---	---	---	30	295	8.9	---	---	---	27	294	8.0	30	272	5.7	29	266	5.9
2,500	28	272	13.3	28	269	9.3	31	330	4.4	30	292	6.9	30	319	13.1	29	270	8.1	---	---	---	31	299	10.3	---	---	---	25	292	10.5	30	286	6.8	29	272	8.1
3,000	26	276	16.8	27	268	12.1	31	327	5.9	30	291	8.7	30	314	13.8	29	269	9.4	---	---	---	31	303	11.0	---	---	---	25	286	11.8	30	288	9.2	27	281	10.1
4,000	24	273	20.5	28	259	15.3	30	316	6.6	28	282	13.6	28	311	16.4	29	275	10.8	---	---	---	31	302	12.6	---	---	---	25	281	15.0	30	304	13.5	26	283	12.4
5,000	19	263	25.7	27	262	18.4	28	309	8.0	24	274	18.1	25	317	15.8	28	273	13.4	---	---	---	30	306	15.4	---	---	---	23	283	17.7	29	306	16.8	25	279	14.4
6,000	11	266	28.2	26	260	20.2	28	297	9.6	20	271	20.0	25	311	17.0	22	274	13.8	---	---	---	27	308	15.8	---	---	---	20	279	18.6	27	314	20.0	23	278	15.7
8,000	7	253	24.4	24	258	24.5	24	310	11.6	17	269	24.8	23	311	19.2	19	272	16.8	---	---	---	25	301	19.0	---	---	---	8	275	18.7	17	296	21.4	16	269	15.7
10,000	---	---	---	22	252	28.8	21	323	13.9	5	279	26.7	17	316	22.5	13	262	17.1	---	---	---	19	299	19.8	---	---	---	---	---	---	13	306	18.1	10	283	14.1	---	---	---
12,000	---	---	---	16	254	31.7	15	317	14.1	---	---	---	13	305	23.0	5	266	18.6	---	---	---	13	293	18.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14,000	---	---	---	7	277	20.6	8	303	22.4	---	---	---	6	319	22.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

[1] Data not received.

NOTE.—Maximum free-air wind velocities for different sections of the United States, based on pilot balloon observations, formerly appearing as Table 3, were discontinued with the December 1947 issue of the REVIEW.

RIVER STAGES AND FLOODS FOR JANUARY 1948

ELMER R. NELSON

Precipitation during January was above normal along the coastal sections of the Atlantic and the Gulf States, from Massachusetts to eastern Texas. It was also above normal in the Columbia Basin and the eastern portion of the Rocky Mountain States. Precipitation was heavy over the greater portion of the latter two areas and ranged from one and one-half to two times the normal seasonal amounts. It was very light and averaged less than 50 percent of normal from California eastward to Colorado and New Mexico and along the Mississippi River Basin.

There was very little snow accumulation during the first half of the month east of the Rockies south of latitude 40°. The heavy snow that fell in the Texas Panhandle and Oklahoma during the beginning of the month melted quickly due to the unseasonably mild temperatures. On the 17th and 18th heavy snow fell over a large area extending from northeastern Texas to southern New England, covering the ground to a depth of one to several inches. Ten to twelve inches fell in northern Tennessee and southern and eastern Arkansas. Frequent light to heavy snow, plus persistent low temperatures from the 17th to the 26th of January, advanced the snow cover to its farthest southern limits, and by the latter date snow cover extended along a line from the northeastern corner of North Carolina to San Antonio, Tex. By the end of the month most of the snow in the southern States had melted, with snow cover remaining in only the northern portions of those States.

At the beginning of the month, several small streams in the Northeastern States as far south as central Pennsylvania had frozen over, with the ice varying in thickness from 3 inches in Pennsylvania to 20 inches at Greenville, Maine. Only shore ice was reported in the larger streams near the coast. In the upper Mississippi and Missouri Valleys the ice varied in thickness from 8 inches, at La Crosse, Wis., to 19 inches, at Bismarck, N. Dak. By the end of the month, floating ice was observed in the Mississippi River as far south as Memphis, Tenn., and in the Ohio River from Cincinnati, Ohio, to Evansville, Ind., with the upper reaches of the two rivers frozen over to considerable depths. Along the East Coast streams were frozen over as far south as Washington, D. C., with 6 inches of ice estimated on the lower Potomac at Washington. In the upper Mississippi and Missouri Valleys, the ice had increased in thickness to 17.5 inches at La Crosse, Wis., and varied from 11.5 inches at Des Moines, Iowa, to 26.5 inches at Bismarck, N. Dak.

Temperatures during January were below normal east of the Rockies except in the Northern and Central Great Plains and the Northern Rocky Mountain Region. It was unusually mild for the first 2 weeks, but the rest of the month was so frigid that it turned out to be one of the coldest on record. For two whole weeks, temperatures at New Orleans, La., and Vicksburg, Miss., averaged 11° to 15° below normal. In the Western States the other extreme prevailed. In Montana, for example, they averaged 4° to 10° above normal. The two Dakotas averaged 2° to 8° above normal.

The drought in Maine continued unabated for the 6th consecutive month. Stream flow was far below normal in a large area extending southwestward from Maine to northern Mississippi. Light flooding occurred along the Atlantic at scattered points from Maryland to Georgia. In Florida run-off continued excessive, while in central and southern California and the southern intermountain region, drought conditions continued unalleviated. Some flooding occurred along the Mississippi River System and in Texas. From the 6th to the 12th, moderate floods occurred in western Oregon in the Willamette River Basin.

Atlantic Slope drainage.—Only minor flooding occurred during the month along the Atlantic Slope from Maryland to Georgia. The light flooding in Maryland occurred on the Monocacy River on the 2d from the heavy rain that occurred on New Year's Day. The rainfall over the Monocacy Basin, which averaged 2.25 inches, caused a sharp rise in the river at Frederick, Md., to nearly 6 feet above flood stage, with little or no damage occurring. Moderate rises also occurred over the Potomac Basin, but no flood stages were reached. In North Carolina, slight flooding occurred along the Roanoke, Neuse, and Cape Fear Rivers around the middle of the month from the heavy rain (1.50 inches) that fell over the watersheds on the 13th. In Georgia, light flooding continued on the Ogeechee and Altamaha Rivers during the beginning of the month from the effects of the December rainfall. Frequent rainfall after the 12th caused additional light flooding on these rivers during the latter half of the month. No material damage resulted from the flooding along this drainage area. The principal losses were to logging interests that had to suspend operations during high water. The inundation of farm bottom land was not especially detrimental since very little planting had been done.

East Gulf of Mexico drainage.—Only minor flooding occurred in this drainage area during the month. The Apalachicola River continued in flood at Blountstown, Fla., during the first week of January, from the effect of the rainfall during December. It was again in flood during the last week of the month. The Tombigbee River at Lock No. 3 went above flood stage on the 31st and continued in flood until February 6th. No damage was reported.

Mississippi System.—Heavy rains of between 1 to 2 inches fell over the Ohio Basin on January 1 and caused light flooding on the Monongahela in Pennsylvania, the Scioto in Ohio, and the West Fork and Wabash Rivers in Indiana. The temperatures over the basin averaged above freezing during the storm period, with very little if any snow on the ground. No damages were reported in the Ohio Basin from the overflows.

The flooding that occurred in the White, Arkansas, and Red Basins was caused by heavy rains that began on December 31. Considerable damage and loss was reported from the smaller tributaries in the Arkansas and Red Basins where run-off was rapid. The greatest stock loss was on the Petit Jean River in Arkansas where about 20 head of cattle were drowned.

Flooding in the Lower Mississippi Basin along the St. Francis River was due to heavy rain, averaging more than 3.50 inches, that occurred on December 31 and January 1. Flash floods occurred in the St. Francis Basin in the hilly area above Wappapello Dam. The damages resulting from these flash floods were principally to livestock and crops. Additional damage was reported near Fisk, Mo.

West Gulf of Mexico drainage.—General rains over Texas on December 31, caused flooding along the Sabine and upper Trinity Rivers during the first few days of January. The rainfall was not excessive but the run-off from this rain was heavy, as the ground was still saturated from the earlier December rains. The crest stages reached are given in the table of flood stages at the end of this report. No damages were reported.

Pacific drainage.—Exceptionally heavy rains occurred over the Shasta Reservoir in the Sacramento River Basin

drainage during the first week in January. These rains were caused by the movement of a series of fronts inland over the Pacific Northwest. The rains were lighter southward over the elevated areas of the Feather and American Rivers. No flooding occurred, as the streams were very low prior to this rainy period. There had been no heavy rain over this basin since October. Heavy local run-off, however, from the steep slopes in the Sacramento River Canyon washed out a section of the Southern Pacific's railroad tracks about 3 miles south of Dunsmuir. The streams receded to unusually low stages by the 31st, as no rain fell over the basin after the 8th of the month. There was also a marked deficiency in the mountain snowpack. At the end of January only a few inches of snow remained on the higher slopes of the Sierra Nevada Mountains. This was the least snow observed in these mountains on the 31st of January in a period of 50 years.

In the Eel River Basin light flooding occurred on the Eel River on the 8th, as a result of the heavy rain which fell over the basin on the 5th and 6th. Two summer bridges were destroyed during the first onrush of the flood waters.

Vast lowland areas of Oregon, Washington, and Idaho in the Columbia River Basin, were inundated as flooding rivers swept through widely scattered valleys of the Pacific Northwest States from the 6th to the 10th of January. It was the severest flood in this area since December 1945. Large amounts of the mountain snows were melted by the rain and warm winds that occurred over the basin during the first 7 days of the month. This rainy period was caused by a series of fronts that passed inland over the Northwestern States. The McKenzie River crested at Leaburg, Oreg., on the 7th at a stage of 19.9 feet, 7.9 feet above flood stage, and at Armitage Bridge on the same date at 15.7 feet, 4.7 feet above flood stage. The Santiam River crested at Jefferson City, Oreg., on the 7th at a stage of 21.8 feet, 8.8 feet above flood stage or 1.2 feet below the record stage of 23.0 feet. The South Yamhill River crested at a record stage of 42.2 feet at Whiteson, Oreg., on the 8th. The Mollalla River crested at a stage of 4.0 feet above flood stage at Canby, Oreg., on the 7th. The Willamette River in Oregon crested at a stage of 3.7 feet above flood stage at Eugene, and 6.8 feet above at Harrisburg on the 7th; 2.8 feet above at Corvallis, and 8.9 feet above at Albany on the 8th; 7.5 feet above at Salem, and 5.0 feet above at Oregon City on the 9th; and 1.4 feet above flood stage at Portland on the 10th. The Columbia River at Vancouver, Wash., reached a stage of 16.5 feet, 1.5 feet above flood stage, on the 10th.

A comparison of this flood with the floods of January 1943 and December 1945, is given in Table 1. The highest crests on record are also given in the table.

TABLE 1.—*Crest stages of floods in the Columbia Basin, including comparison of January 1948 flood with previous floods*

Station and Drainage	Flood stage	1948 Crest		1945 Crest		1942-43 Crest		Maximum of record	
		Stage	Date	Stage	Date	Stage	Date	Stage	Date
	Feet	*Feet*		*Feet*		*Feet*		*Feet*	
Middle Fork: Eula, Oreg.	13	13.0	Jan. 6	18.8	Dec. 28	17.0	Dec. 31	18.8	Dec. 28, 1945
Coast Fork: Saginaw, Oreg.	9	10.7	do	12.4	do	11.9	Dec. 30-31	12.9	Feb. 20, 1927
McKenzie River:									
Leaburg, Oreg.	12	19.9	Jan. 7	25.5	do	22.8	Jan. 1	[1] 25.5	Dec. 28, 1945
Armitage Bridge, Oreg.	11	15.7	do	17.4	Dec. 29				
Marys River: Philomath, Oreg.	20	20.5	do						
Calapooya River: Holley, Oreg.	10.5	11.0	do	14.0	Dec. 28	12.1	Dec. 31		
Santiam River: Jefferson, Oreg.	13	21.8	do	22.6	Dec. 29	21.3	Jan. 1	23.0	Nov. 21, 1921
South Yamhill River:									
Whiteson, Oreg.	38	42.2	Jan. 8	39.8	Dec. 30	40.9	Dec. 30		
Molalla River: Canby, Oreg.	11	15.0	Jan. 7	12.2	Dec. 28-29				
Tualatin River: Dilley, Oreg.	12	12.4	do	12.2	Dec. 29				
Willamette River:									
Eugene, Oreg.	12	15.7	do	18.5	do	16.7	Dec. 31-Jan. 1	22.0	Jan. 25, 1903
Harrisburg, Oreg.	12	18.8	do	19.6	do	17.1	Jan. 1	19.6	Dec. 29, 1945
Corvallis, Oreg.	24	26.8	Jan. 8	28.2	Dec. 30	28.1	Jan. 2	[1] 28.2	Dec. 30, 1945
Albany, Oreg.	20	28.9	do	30.0	do	30.6	do	31.3	Jan. 26, 1903
Salem, Oreg.	20	27.5	Jan. 9	28.4	do	30.6	do	31.3	Feb. 6, 1907
Oregon City, Oreg.	12	17.0	do	16.5	Dec. 31	18.3	Jan. 3	19.6	Jan. 9, 1923
Portland, Oreg.	18	19.4	Jan. 10			20.2	do	33.0	June 7, 1894
Columbia: Vancouver, Wash.	15	16.5	do			16.3	Jan. 4	25.5	June 19, 1933

[1] Highest of short period of record.

The U. S. Weather Bureau Regional Office summary of damages from the flood included an estimate of the total damage, excluding that from erosion, amounting to $6,000,000. Erosion losses in agricultural areas, however, were believed greater than the combined total of all other losses. For the most part, in both agricultural and industrial areas adequate precautions were taken in the way of evacuating people, equipment, and supplies to keep losses down. Agricultural losses, to crops, orchards, and livestock, were small, since crops had been harvested and livestock were protected. Industry's greatest loss was 2½ days' operating time. In residential areas losses were confined mostly to real property rather than to personal property. The deaths of two persons have been attributed to the effects of the flood waters.

FLOOD STAGE REPORT FOR JANUARY 1948

[All dates in January unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest [1]	
		From—	To—	Stage	Date
ST. LAWRENCE DRAINAGE					
Lake Erie	*Feet*			*Feet*	
Maumee: Defiance, Ohio	10	3	3	10.6	3
ATLANTIC SLOPE DRAINAGE					
Monocacy: Frederick, Md	10			15.8	2
Roanoke: Williamston, N. C	10	19	24	10.3	20
Neuse:					
Neuse, N. C	14	15	16	15.1	16
Smithfield, N. C	13	15	18	14.3	17
Cape Fear:					
Lock No. 2, Elizabethtown, N. C	20	15	17	23.4	16
Edisto: Givhans Ferry, S. C	10	Dec. 13	8	13.4	Dec. 24
Ogeechee: Dover, Ga	7	Dec. 13	9	9.1	Dec. 21-22
		21	(2)	7.4	29
Altamaha:					
Charlotte, Ga	12	Dec. 11	10	17.2	Dec. 27
		22	22	12.0	22
		25	(2)	13.2	31
Piney Bluff, Ga	17	Dec. 14	6	18.4	Dec. 23, 24, 25
EAST GULF OF MEXICO DRAINAGE					
Apalachicola: Blountstown, Fla	15	Dec. 12	6	20.5	Dec. 20
		25	(2)	16.5	29
Tombigbee: Lock No. 3, Ala	33	31	Feb. 6	40.0	Feb. 3
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Mississippi: Louisiana, Mo	12	3	3	12.0	3
		7	7	12.0	7
		10	12	12.0	10-12
		14	14	12.0	14
		21	23	12.0	21-23
Ohio Basin					
Monongahela: Lock No. 2, Braddock, Pa	20.5	2	2	22.7	2
Scioto:					
La Rue, Ohio	11	2	3	12.4	2
Circleville, Ohio	14	3	3	15.0	3
West Fork:					
Anderson, Ind	10	1	3	13.4	2
Elliston, Ind	18	3	6	20.5	5
Edwardsport, Ind	12	2	9	17.6	6-7
Wabash:					
Wabash, Ind	12	2	3	12.9	2
La Fayette, Ind	11	3	5	13.9	4
Covington, Ind	16	5	5	16.1	5
White Basin					
Black:					
Poplar Bluff, Mo	16	2	6	18.1	3
Black Rock, Ark	14	1	15	19.8	2
Arkansas Basin					
Poteau: Poteau, Okla	21	2	3	29.3	2
Petit Jean: Danville, Ark	20	1	9	25.4	1

FLOOD STAGE REPORT FOR JANUARY 1948—Continued

River and station	Flood stage	Above flood stages—dates		Crest [1]	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Red Basin					
Ouachita:	*Feet*			*Feet*	
Arkadelphia, Ark	17	2	4	21.4	
Camden, Ark	26	4	9	29.6	7
Little:					
Horatio, Ark				32.4	2
Whitecliffs, Ark	25	4	8	27.4	5
Sulphur:					
Hagansport, Tex	39	1	5	42.5	2
Naples, Tex	22	4	12	27.1	6
Lower Mississippi Basin					
St. Francis:					
Fisk, Mo	20	2	13	23.6	5, 6
St. Francis, Ark	18	5	19	20.8	9, 10
WEST GULF OF MEXICO DRAINAGE					
Sabine:					
Mineola, Tex	14	2	8	17.7	5
Gladewater, Tex	26	Dec. 13	Dec. 31	32.8	Dec. 24
		9	13	28.2	11
Elm Fork: Carrollton, Tex	6	1	1	6.3	1
East Fork: Rockwall, Tex	10	1	4	14.4	2
Trinity:					
Dallas, Tex	28	1	3	30.8	2
Rosser, Tex	26	1	5	28.1	4
Trinidad, Tex	28	4	9	30.0	7
PACIFIC SLOPE DRAINAGE					
Eel Basin					
Eel: Fernbridge, Calif	17.5	7	7	18.0	7
Columbia Basin					
Middle Fork: Eula, Oreg	13	6	6	13.0	6
Coast Fork: Saginaw, Oreg	9	6	6	10.7	6
McKenzie River:					
Leaburg, Oreg	12	2	2	12.0	2
		6	8	19.9	7
Armitage Bridge, Oreg	11	6	8	15.7	7
Marys River: Philomath, Oreg	20	7	7	20.5	7
Calapooya River: Holley, Oreg	10.5	7	7	11.0	7
Santiam River: Jefferson, Oreg	13	2	3	16.0	2
		6	9	21.8	7
South Yamhill River: Whiteson, Oreg	38	7	9	42.2	8
Molalla River: Canby, Oreg	11	6	7	15.0	7
Tualatin River: Dilley, Oreg	12	7	8	12.4	7
Willamette River:					
Eugene, Oreg	12	7	8	15.7	7
Harrisburg, Oreg	12	3	3	14.4	3
		6	10	18.8	7
Corvallis, Oreg	24	8	9	26.8	8
Albany, Oreg	20	7	10	28.9	8
Salem, Oreg	20	7	10	27.5	9
Oregon City, Oreg	12	7	12	17.0	9
Portland, Oreg	18	9	11	19.4	10
Columbia River: Vancouver, Wash	15	9	11	16.5	10

[1] Provisional.

[2] Continued at end of month.

CLIMATOLOGICAL DATA FOR JANUARY 1948

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW, January 1943, p. 15]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	40.4	−6.1	2 stations	77	9	Valley Head	1	[1] 18	4.82	−0.33	Spring Hill	6.87	Falkville	2.69
Arizona	43.2	+1.3	Pisinemo	87	9	Alpine	−19	28	.16	−1.10	Burrus Ranch	1.12	51 stations	.00
Arkansas	33.5	−7.6	Stuttgart	77	9	Marianna	−7	18	3.32	−.93	Mena	7.69	Perryville	.43
California	47.8	+3.0	Mecca	92	22	Bridgeport Dam	−7	27	2.02	−2.59	Upper Mattole	17.33	72 stations	.00
Colorado	22.6	−1.3	Eversoll Ranch	76	7	Alamosa (airport)	−50	28	1.08	+.29	La Veta Pass	6.78	Kline (near)	.03
Florida	56.4	−2.7	Brooksville	89	27	Niceville	14	15	4.96	+2.15	St. Petersburg	10.39	Key West	1.12
Georgia	41.4	−5.6	Folkston	77	1	Blairsville	1	15	4.20	+.12	Savannah No. 2	6.03	Fitzgerald	2.79
Idaho	25.5	+1.5	Grand View	66	7	Island Park Dam	−37	[1] 27	1.88	−.24	Burke	6.87	Grand View	T
Illinois	22.5	−5.3	East St. Louis	66	8	Freeport	−17	17	1.68	−.60	Chester	4.70	Belvidere	.36
Indiana	22.2	−6.8	Scottsburg	64	1	Brookville	−19	28	2.36	−.60	Petersburg	3.98	Gary	.45
Iowa	17.6	−2.3	Creston	58	8	Oakland	−27	23	.45	−.57	Burlington	1.90	6 stations	T
Kansas	27.9	−2.2	Ashland	76	8	Burr Oak	−23	28	.59	−.11	Emmett	2.20	Ellis	.12
Kentucky	26.8	−8.9	Pikeville	72	1	Headquarters	−21	25	3.19	−1.15	Corbin	5.56	Murray	1.94
Louisiana	43.4	−8.0	Abbeville	80	10	Tallulah	−2	24	5.06	+.08	New Roads	8.65	New Orleans (airport)	2.71
Maryland-Delaware.	26.5	−6.7	Cheltenham, Md	64	9	Oakland, Md	−20	19	5.17	+1.81	Lewes, Del	9.30	Western Port, Md	2.45
Michigan	15.3	−5.6	Benton Harbor	45	9	Watersmeet	−46	18	1.68	−.27	Houghton	6.74	Rudyard	.16
Minnesota	6.0	−3.7	Tracy	47	7	Moose Lake	−47	17	.40	−.33	Grand Marais	1.78	Fairmont	.04
Mississippi	39.0	−8.1	Columbia	79	9	2 stations	−7	[1] 18	4.86	−.28	Biloxi	8.48	Stoneville	2.28
Missouri	25.7	−5.2	Ozark Beach	73	8	Maryville	−22	23	2.23	−.07	Annapolis	5.73	Joplin Airport	.25
Montana	23.7	+3.9	Yellowtail Dam	67	7	West Yellowstone	−48	27	1.08	+.17	Haugan	5.09	Lima	.02
Nebraska	23.7	+.3	Haigler	70	7	Ewing	−31	23	.32	−.21	Beaver City	1.13	3 stations	T
Nevada	35.0	+5.2	Lathrop Wells	77	24	Battle Mountain Airport.	−14	27	.25	−.91	Marlette Lake	2.54	28 stations	.00
New England	16.9	−5.4	Block Island, R. I.	48	9	Lemington, Vt	−37	31	3.42	+.01	Plymouth, Mass	7.95	St. Albans, Vt	.91
New Jersey	24.1	−6.7	Millville Airport	52	9	Canoe Brook	−22	19	4.78	+1.15	Atlantic City	8.14	Layton	2.72
New Mexico	31.5	−1.9	Artesia	84	8	Eagle Nest	−43	28	.55	−.04	Levy	2.80	Hatchita	.00
New York	16.3	−6.6	South Wales	50	8	2 stations	−36	31	2.59	−.28	Bridgehampton	6.29	Massena	.47
North Carolina	35.4	−6.0	Whiteville	77	1	Mount Mitchell	−13	14	4.19	+.41	New Bern	6.45	Enka	1.69
North Dakota	9.3	+2.2	Golva	59	5	Willow City	−42	[1] 17	.40	−.07	Amidon	.99	Medina	.06
Ohio	21.0	−7.4	Chesapeake	65	1	New Lexington	−26	28	2.37	−.59	Chesapeake	4.39	Willoughby	.98
Oklahoma	32.6	−5.5	Woodward	77	9	Kenton	−19	28	.96	−.46	Idabel	6.66	Fort Supply Dam	T
Oregon	33.9	+2.1	Lake Creek	70	25	Austin	−9	26	4.06	+.30	Illahe	17.30	Richland	.29
Pennsylvania	20.1	−8.1	Waynesburg	57	1	Kane	−31	31	3.00	−.13	New Park	5.74	Jamestown	1.36
South Carolina	39.8	−6.1	Ridgeland	82	9	Caesars Head	0	15	3.66	+.08	Santuck	6.19	Walterboro	1.50
South Dakota	17.3	+.1	2 stations	64	7	3 stations	−35	[1] 23	.37	−.17	Dupont	2.64	4 stations	T
Tennessee	30.7	−8.3	Knoxville (Univ. of Tenn.).	73	1	Bolivar	−14	18	4.17	−.67	Linden	6.93	Paris	2.24
Texas	42.4	−5.8	Rio Grande City	92	1	Stratford	−10	28	2.81	+1.00	Anahuac	6.40	4 stations	T
Utah	26.7	+1.2	St. George	72	24	Scofield Dam	−38	27	.57	−.64	Alta	4.39	8 stations	.00
Virginia	29.9	−6.5	Columbia	70	9	Timberville	−14	25	3.35	+.08	Pinnacles	5.71	Copper Hill	1.47
Washington	31.6	+1.0	Point Grenville	65	29	Winthrop	−8	[1] 8	4.33	−.30	Wind River	17.56	Irene Mountain	.48
West Virginia	24.4	−8.2	2 stations	70	1	Mannington	−25	28	3.06	−.50	Creston	5.85	Beckley	1.43
Wisconsin	10.6	−4.7	Darlington	43	8	Mellen	−45	18	.55	−.68	Lac Vieux Desert	2.52	Galesville	.02
Wyoming	20.7	+.7	5 stations	65	7	Bondurant	−48	27	.81	+.03	Northeast Entrance	4.51	2 stations	T
Alaska (Dec.)	12.2	+6.8	Point Retreat	54	2	Fort Yukon	−40	27	2.71	+.22	Whittier	34.65	Savoonga	T
Hawaii	67.4	−1.2	Mahukona	86	21	Haleakala R. S.	33	17	12.50	+5.35	Kukui	58.00	Pohakuloa	1.70
Hawaii (Dec.)	69.5	−.2	Mahukona	88	[1] 1	Haleakala R. S.	31	14	9.20	+1.19	Kailua	41.00	Hualalei	.00
Puerto Rico	74.0	+1.1	Ponce	94	28	2 stations	50	[1] 8	3.00	−.31	Rio Blanco (1,800 feet)	11.62	Potala	.00

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR JANUARY 1948

District and station	Elevation of instruments: Barometer above sea level	Thermometer above ground	Anemometer above ground	Pressure: Station	Sea level	Departure from normal	Temperature of the air: Mean	Departure from normal	Maximum	Date	Mean maximum	Minimum	Date	Mean minimum	Greatest daily range	Total degree days	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Departure from normal	Greatest in 24 hours	Days with 0.01 inch or more	Wind: Average hourly velocity	Prevailing direction	Maximum velocity: Miles per hour	Direction	Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
NEW ENGLAND	Ft.	Ft.	Ft.	Mb.	Mb.	Mb.	° F.	° F.	° F		° F	° F.		° F.	° F.		° F.	%	In.	In.	In.		Mi.								0-10	In.	In.	
							20.6	−4.2										79	4.44	+0.9											6.5			
Eastport	75	67	82	1,012.5	1,015.6	+0.4	18.6	−1.8	40	9	26	−11	30	11	36	1,438	14	78	5.10	+1.2	1.37	16	13.0	nw.	38	e.	2	4	9	18	7.2	43.7	20.6	0
Portland, Maine [2]	103	6	43	1,013.2	1,016.9	−.4	15.6	−4.5	39	9	26	−21	24	5	42	1,531	10	80	2.39	−1.6	.74	11	8.8	n.	33	n.	2	10	6	15	6.1	30.5	20.4	0
Concord [2]	289	5	45	1,006.8	1,018.0	−.7	14.1	−4.9	38	9	26	−23	26	2	46	1,579	8	79	2.41	−.6	.61	12	7.3	nw.	31	nw.	30	9	6	16	6.3	32.6	17.5	0
Burlington [2]	403	6	51	1,003.1	1,018.6	+1.0	12.4	−6.4	35	9	23	−22	24	2	39	1,632	8	82	1.41	−.4	.31	14	9.3	s.	40	s.	12	6	9	16	6.9	18.3	11.6	0
Boston [2]	124	33	62	1,012.8	1,017.6	+.3	23.4	−4.5	45	9	30	−3	30	16	25	1,294	16	72	5.11	+1.5	1.11	14	12.9	nw.	41	ne.	2	8	2	21	6.9	32.5	17.2	0
Nantucket [2]	12	4	34	1,016.3	1,016.6	−.3	27.8	−3.5	48	21	34	5	30	21	30	1,154	24	83	7.15	+3.4	2.51	15	15.7	nw.	46	e.	2	7	5	19	7.1	15.3	2.7	0
Block Island	26	11	46	1,015.9	1,016.9	−.4	27.4	−3.6	48	9	34	7	31	21	25	1,165	22	82	5.56	+1.8	1.53	14	19.1	nw.	52	nw.	10	9	4	18	6.4	8.4	.2	0
Providence [2]	159	65	60	1,011.5	1,017.6	−.4	24.4	−2.8	45	9	32	−1	30	17	30	1,260	14	72	6.15	+2.4	1.45	12	8.7	n.	32	sw.	12	10	2	19	6.5	31.9	16.3	0
Hartford [2]	159	5	44	1,012.5	1,019.0	+.4	20.0	−5.5	45	9	30	−16	19	10	35	1,396	14	80	4.17	+.2	1.02	13	8.6	n.	32	nw.	10	9	7	15	6.0	27.6	28.0	0
New Haven [2]	107	5	39	1,014.6	1,018.6	.0	22.8	−4.6	46	9	31	−8	19	15	34	1,306	14	68	4.99	+1.3	1.43	14	7.6	n.	23	ne.	24	11	4	16	6.0	28.0	12.4	0
MIDDLE ATLANTIC																														6.4			
							26.9	−5.0										73	4.37	+1.0														
Albany [2]	97	6	40	1,015.6	1,019.3	+.3	15.3	−4.8	38	9	25	−26	31	6	36	1,537	9	78	2.40	.0	.74	10	8.8	w.	35	w.	9	9	4	18	6.7	27.7	18.5	0
Binghamton [4]	871	57	79	986.1	1,019.3	+.7	18.1	−6.0	42	9	27	−20	31	10	37	1,455	10	80	2.69	+.2	1.09	14	6.0	w.	24	w.	10	6	8	17	7.0	24.9	10.8	0
New York [4]	314	415	454	1,007.5	1,019.6	+.6	25.9	−5.0	45	9	33	0	31	19	21	1,211	16	66	4.83	+1.2	1.53	13	15.2	nw.	49	nw.	10	9	7	15	6.1	15.1	8.6	0
Harrisburg [2]	374	30	49	1,006.1	1,020.7	+.4	23.6	−5.4	49	9	31	−4	29	17	35	1,282	16	74	2.75	−.3	1.65	12	8.3	nw.	33	nw.	10	9	7	15	6.2	17.0	3.0	0
Philadelphia [4]	114	174	150	1,015.2	1,020.0	.0	27.3	−5.3	50	9	33	6	31	22	19	1,169	20	78	5.42	+2.1	2.33	15	8.1	n.	23	n.	24	14	4	13	5.4	10.3	1.0	0
Reading	323	47	306	1,007.8	1,020.7	+.4	24.8	−6.3	47	9	32	2	31	18	29	1,250	---	---	4.13	+.6	1.77	16	10.5	nw.	34	nw.	10	10	6	15	6.2	18.9	6.3	0
Scranton	805	72	104	989.5	1,020.3	+.7	19.9	−6.7	43	9	27	−9	19	12	29	1,398	---	---	2.57	−.5	.81	10	6.8	n.	28	nw.	10	8	8	15	6.4	23.1	9.0	0
Atlantic City	52	37	172	1,017.3	1,019.3	−.3	29.4	−3.1	48	9	36	4	31	22	25	1,107	22	74	8.14	+4.6	2.76	17	16.0	w.	54	ne.	24	10	5	16	6.4	8.5	.6	0
Trenton	190	89	107	1,012.5	1,020.0	+.4	25.5	−5.0	47	9	32	2	31	19	23	1,225	---	---	4.56	+1.2	1.78	16	9.5	n.	28	nw.	10	12	4	15	5.7	12.3	1.5	0
Baltimore [4]	123	100	215	1,015.9	1,020.7	+.4	29.3	−4.5	58	9	35	7	31	23	24	1,104	18	68	5.83	+2.3	2.96	11	11.3	nw.	38	w.	7	10	7	14	6.1	8.9	1.7	0
Washington [4]	112	56	100	1,016.9	1,021.3	+1.0	29.2	−4.2	61	9	36	5	31	22	26	1,110	21	74	4.99	−1.4	1.71	11	8.0	n.	28	nw.	7	8	5	18	6.7	11.7	3.8	1
Cape Henry	18	8	54	1,019.0	1,019.6	−.4	35.7	−4.5	66	1	43	19	31	29	32	910	28	72	3.87	+.7	1.42	10	15.3	n.	56	e.	24	7	6	18	6.7	7.4	3.5	0
Lynchburg [2]	686	5	58	994.2	1,020.0	+.7	31.4	−3.9	64	9	40	7	15	23	30	1,042	20	68	4.30	+.9	2.13	13	8.4	s.	29	ne.	24	5	10	16	6.6	12.1	8.1	1
Norfolk [4]	91	80	125	1,016.9	1,020.3	−.4	36.0	−4.6	66	1	43	17	25	29	29	895	26	73	4.36	+1.3	1.63	12	10.2	n.	39	e.	24	6	8	17	6.8	8.7	3.8	0
Richmond [4]	144	11	52	1,014.6	1,019.6	−1.1	32.2	−5.7	64	9	40	5	25	24	34	1,013	21	72	4.69	+1.5	2.29	11	7.8	n.	25	w.	22	4	8	19	7.3	13.2	1.4	0
SOUTH ATLANTIC																														5.8			
							40.3	−4.5										76	4.55	+1.0														
Asheville	2,253	77	92	------	------	------	32.4	−3.0	60	8	41	6	15	24	38	1,013	---	---	2.55	−.6	.92	12	9.5	nw.	42	ne.	24	5	10	16	6.5	7.7	.7	0
Charlotte [4]	779	63	86	991.5	1,020.3	−.7	37.0	−4.2	69	9	45	14	15	29	26	871	26	72	4.69	+.7	1.69	11	7.6	sw.	29	sw.	2	7	9	15	6.3	.6	.7	0
Greensboro [2]	886	6	56	987.8	1,020.7	.0	33.4	−4.5	68	1	43	7	25	23	34	979	24	74	3.95	+.4	1.18	9	8.6	sw.	35	ne.	24	9	6	16	6.2	3.9	2.4	0
Hatteras	11	5	47	1,019.0	1,019.3	−.7	41.8	−5.3	70	1	49	25	15	35	30	718	36	80	6.16	+1.7	1.84	13	15.4	n.	34	sw.	1	8	7	16	6.1	T	.0	1
Raleigh [4]	376	5	71	1,006.1	1,020.3	−.7	35.7	−5.4	72	1	44	13	15	27	29	911	26	77	4.70	+1.0	1.62	12	7.5	nw.	26	sw.	2	7	8	16	6.5	2.6	.8	0
Wilmington	72	73	107	1,019.3	1,020.7	+.6	41.1	−5.4	72	1	50	18	15	32	33	742	32	79	6.17	+2.9	1.42	14	9.7	n.	36	s.	1	13	5	13	5.3	T	.5	1
Charleston [4]	48	11	92	1,018.6	1,020.3	−2.3	44.6	−5.3	71	1	52	20	15	37	25	630	33	82	3.88	+.9	1.85	14	10.9	n.	29	ne.	24	14	6	11	5.0	.0	T	2
Columbia, S. C. [4]	347	70	91	1,007.8	1,020.7	−.6	41.0	−5.0	72	1	50	16	15	32	30	741	30	76	3.93	+.5	1.20	12	8.2	ne.	29	s.	1	12	6	13	5.6	T	T	0
Greenville, S. C. [2]	1,040	18	36	981.7	1,020.0	−.3	36.2	−4.1	68	9	44	11	15	28	28	896	26	72	3.76	−1.1	1.13	13	9.2	ne.	44	ne.	24	7	9	15	6.4	4.0	.2	0
Augusta [4]	182	62	77	1,013.9	1,020.7	−.3	42.2	−4.8	72	9	51	18	15	33	35	703	30	70	4.20	+.3	1.33	12	6.3	nw.	22	w.	2	11	7	13	5.5	.0	.0	0
Savannah [2]	65	19	51	1,018.3	1,020.7	−1.7	46.2	−3.6	72	9	56	19	15	36	33	584	36	78	4.49	+1.7	1.35	13	10.9	ne.	38	nw.	4	14	4	13	5.1	.0	.0	0
Jacksonville [4]	43	86	110	1,018.6	1,020.3	−1.0	52.0	−3.4	77	27	61	22	15	43	31	411	42	82	6.16	+3.4	2.27	12	8.8	ne.	28	nw.	14	12	6	13	5.4	.0	.0	3
FLORIDA PENINSULA																														5.6			
							64.7	−1.3										84	4.23	+1.9														
Key West [4]	21	10	64	1,016.9	1,017.6	−1.7	69.4	−.1	83	1	75	48	15	64	20	31	62	84	1.12	−.8	.43	8	9.6	ne.	29	n.	14	9	11	11	5.4	.0	.0	2
Miami [4]	25	242	249	1,017.3	1,018.3	−1.7	66.4	−1.5	81	31	72	33	15	60	28	66	58	84	3.56	+1.3	2.16	13	13.6	nw.	38	nw.	14	7	14	10	5.8	.0	.0	0
Tampa [2]	35	5	36	1,018.0	1,019.3	−1.4	58.2	−2.2	78	27	68	27	15	48	34	220	50	85	8.02	+5.3	3.01	9	7.9	ne.	28	w.	24	10	10	11	5.6	T	.0	3
EAST GULF																														5.7			
							42.2	−6.2										77	4.12	−.7														
Atlanta [2]	1,173	33	72	977.7	1,021.0	−.3	37.4	−5.1	66	9	46	11	15	28	31	856	28	72	3.47	−1.6	1.21	12	11.1	nw.	37	nw.	4	10	7	14	6.0	0.9	.0	1
Macon [4]	370	79	87	1,007.1	1,021.0	+.3	42.1	−4.7	72	9	52	16	15	32	37	709	30	68	4.48	+.3	1.23	13	6.8	n.	26	nw.	4	12	7	12	5.4	T	T	0
Apalachicola	35	11	51	1,019.0	1,020.3	+.7	49.6	−4.1	68	10	58	26	15	42	26	479	42	80	3.43	−.2	.94	10	8.8	nw.	27	se.	23	13	8	10	5.0	.0	.0	2
Pensacola [4]	56	54	79	1,019.3	1,021.3	.0	46.6	−5.9	69	1	56	19	18	37	27	571	37	78	4.63	+.6	.98	12	8.7	n.	26	w.	1	13	7	11	5.2	.0	.0	4
Anniston	618	6	32	1,002.4	1,022.4	+1.1	36.6	−8.0	68	1	48	11	15	25	38	881	29	80	3.82	−1.3	.83	14	----	ne.	---	------	--	9	7	15	6.4	1.7	.0	3
Birmingham [2]	700	5	63	996.3	1,022.4	+.4	36.8	−6.1	68	1	47	9	18	27	37	876	28	77	3.73	−1.8	1.06	13	8.8	n.	34	sw.	1	9	5	17	6.3	5.5	.0	2
Mobile [4]	57	86	161	1,019.6	1,021.7	+.4	45.5	−6.0	71	9	56	16	18	35	31	604	36	80	6.07	+1.2	1.80	13	9.3	n.	29	n.	13	13	5	13	5.5	.0	.0	3
Montgomery [4]	218	92	105	1,013.5	1,021.3	−.7	42.0	−6.2	72	9	52	14	18	32	33	717	32	78	3.97	−1.2	1.40	13	7.9	n.	27	w.	1	14	4	13	5.5	1.6	.0	1
Meridian [4]	375	67	92	1,008.5	1,022.4	+1.1	39.5	−7.5	73	9	49	11	18	30	35	794	30	77	3.93	−1.4	1.14	12	7.0	n.	26	w.	1	10	10	11	5.6	5.8	.0	2
Vicksburg [4]	247	82	102	1,013.5	1,023.0	+1.3	40.0	−8.2	73	8	49	11	18	31	33	778	28	78	2.91	−2.5	.88	14	9.6	n.	28	w.	1	8	9	14	6.4	7.5	T	2
New Orleans	53	76	84	1,020.0	1,022.0	+1.0	47.6	−6.6	75	9	56	21	24	39	32	542	38	76	4.92	+.6	1.13	14	7.9	ne.	23	ne.	13	14	4	13	5.5	0.0	.0	0
WEST GULF																														6.1			
							43.2	−6.2										76	2.19	−.6														
Shreveport [2]	249	5	64	1,013.9	1,023.4	+2.1	39.1	−8.3	77	9	48	14	18	30	36	804	30	76	4.39	+.5	1.28	11	9.7	n.	34	w.	1	9	2	20	6.7	12.4	T	2
Fort Smith [2]	463	6	30	1,006.4	1,023.4	+2.4	33.4	−6.1	66	8	43	9	28	24	34	979	23	70	.79	−1.8	.40	6	7.5	ne.	30	w.	1	8	6	17	6.3	3.2	T	0
Little Rock [2]	357	26	58	1,010.5	1,024.0	+1.0	34.9	−6.5	62	9	43	10	24	27	33	929	25	68	1.56	−3.2	.53	10	8.7	n.	38	sw.	1	13	3	15	5.7	3.1	1.2	0
Austin [2]	605	5	41	1,000.0	1,022.4	+1.7	43.2	−6.3	78	22	54	18	28	32	46	681	34	74	.92	−1.2	.38	9	10.3	n.	38	n.	23	10	6	15	5.8	T	.0	0
Brownsville [2]	57	5	54	1,017.6	1,019.6	+1.0	55.0	−4.8	81	9	66	28	29	44	39	353	48	85	1.50	−.3	.64	7	10.4	nw.	31	n.	16	4	12	15	6.8	T	.0	1
Corpus Christi [2]	20	6	33	1,020.3	1,021.3	+1.3	51.4	−2.6	81	9	62	25	28	41	39	436	44	83	.86	------	.21	8	11.3	n.	35	n.	16	9	8	14	6.1	.0	.0	3
Dallas [2]	512	34	45	1,004.4	1,023.4	+2.4	38.8	−6.6	72	5	48	13	28	30	33	810	30	74	.82	−1.6	.22	9	9.7	ne.	34	nw.	1	11	3	17	5.8	5.4	T	0
Fort Worth [2]	679	40	56	998.3	1,023.4	+2.7	38.4	−6.0	73	8	47	11	28	30	35	826	29	74	.96	−1.1	.41	6	11.3	n.	35	nw.	1	11	6	14	5.6	7.9	T	0
Galveston [4]	54	122	129	1,020.0	1,022.0	+1.3	47.6	−6.2	72	12	54	22	24	41	33	540	43	85	3.43	.0	1.32	10	13.1	n.	34	ne.	23	10	4	17	6.2	T	.0	1
Houston [4]	138	157	190	1,016.6	1,022.4	+1.7	46.8	−5.9	80	9	55	22	24	38	32	574	39	81	4.03	+.3	1.07	12	10.7	n.	34	n.	23	9	8	14	6.1	T	.0	2
Palestine	510	64	72	1,004.4	1,023.0	+2.0	41.4	−6.8	71	8	49	17	24	33	30	731	32	71	3.90	+.5	1.54	11	8.1	n.	27	w.	1	9	5	17	6.4	3.9	----	0
Port Arthur [4]	34	59	134	1,020.7	1,021.7	+1.0	45.8	−8.0	75	9	54	17	24	38	34	595	38	82	4.76	+1.1	1.56	13	13.6	n.	36	ne.	19	9	7	15	6.1	1.4	.0	3
San Antonio [2]	693	6	51	996.3	1,021.3	+1.3	45.4	−6.9	79	22	57	19	24	34	46	607	34	70	.61	−.8	.23	7	9.6	n.	32	ne.	16	9	6	16	6.0	T	.0	2
OHIO VALLEY AND TENNESSEE																														7.2			
							25.4	−7.0										77	2.94	−.9														
Chattanooga [2]	762	6	66	993.2	1,021.7	.0	33.8	−5.3	67	1	43	7	25	24	35	967	26	72	4.44	−.8	1.70	12	8.9	n.	32	sw.	1	4	9	18	7.0	4.9	T	2
Knoxville [2]	995	27	71	984.8	1,022.0	+.7	32.2	−5.5	70	1	41	2	25	24	32	1,014	24	72	3.57	−1.1	1.41	12	9.0	ne.	39	sw.	1	4	9	18	7.4	9.1	.8	0
Memphis [2]	399	5	49	1,008.1	1,023.4	+1.7	32.2	−7.5	66	8	41	3	18	23	32	1,015	24	74	2.67	−2.1	1.18	10	9.3	n.	34	sw.	1	10	6	15	6.0	15.1	2.2	1
Nashville [2]	546	5	72	1,002.0	1,022.7	+.7	29.4	−9.2	65	1	40	−2	25	19	36	1,101	22	74	5.59	+.8	2.93	12	9.7	n.	46	sw.	1	3	13	15	7.0	18.8	4.4	1
Lexington [2]	989	4	58	984.4	1,022.4	+2.1	23.4	−9.5	65	1	32	−3	18	15	37	1,288	18	80	2.58	−1.6	1.38	12	----	sw.	---	------	--	2	9	20	7.6	21.1	6.0	1
Louisville [2]	525	5	54	1,004.7	1,022.7	+1.4	25.5	−7.9	62	1	34	−6	26	16	35	1,226	18	74	2.54	−1.5	1.42	12	8.4	s.	35	sw.	1	6	5	20	7.6	9.0	3.5	1

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR JANUARY 1948—Continued

District and station	Elevation of instruments: Barometer above sea level	Thermometer above ground	Anemometer above ground	Pressure: Station	Sea level	Departure from normal	Temperature of the air: Mean	Departure from normal	Maximum	Date	Mean maximum	Minimum	Date	Mean minimum	Greatest daily range	Total degree days	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Departure from normal	Greatest in 24 hours	Days with 0.01 inch or more	Wind: Average hourly velocity	Prevailing direction	Maximum velocity: Miles per hour	Direction	Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
OHIO VALLEY AND TENNESSEE—Con.	Ft.	Ft.	Ft.	Mb.	Mb.	Mb.	°F.	°F.	°F		°F	°F.		°F.	°F		°F.	%	In.	In.	In.		Mi.								0–10	In.	In.	
Evansville [2]	431	12	40	1,006.8	1,023.4	+1.7	25.4	−6.2	62	1	35	−4	28	16	36	1,230	19	80	2.02	−1.7	.48	10	9.0	nw.	37	sw.	1	4	3	24	7.8	4.6	1.0	1
Indianapolis [2]	823	5	54	990.2	1,021.7	+1.4	21.0	−6.3	54	8	30	−10	28	12	28	1,365	16	80	2.52	------	2.45	10	11.3	nw.	34	ne.	1	6	8	17	6.9	4.1	.6	1
Terre Haute [2]	575	4	36	1,001.0	1,023.0	+2.3	22.0	−6.7	55	8	31	−10	28	13	34	1,333	16	78	1.83	−.9	.09	6	10.6	nw.	35	ne.	1	4	10	17	7.1	3.0	.3	1
Cincinnati [4]	627	135	148	998.6	1,022.4	+1.4	26.0	−4.3	61	1	34	−1	26	18	29	1,210	16	79	2.72	−.8	1.82	12	5.4	nw.	19	nw.	4	2	11	18	7.3	10.5	5.5	0
Columbus [4]	822	90	110	990.5	1,021.7	+1.4	22.2	−6.4	58	1	30	−6	26	15	30	1,324	14	80	2.16	−.9	1.30	16	10.1	s.	28	s.	1	6	9	16	6.8	11.2	4.0	1
Dayton [2]	1,003	6	55	983.7	1,022.0	+2.0	20.2	−7.5	53	1	29	−10	28	12	27	1,391	14	80	2.32	−.9	1.65	13	12.0	nw.	36	w.	9	3	11	17	7.3	9.0	1.9	1
Elkins [2]	1,947	5	45	948.5	1,021.3	.0	21.7	−8.3	59	1	32	−14	19	11	50	1,343	16	82	3.46	−.3	.97	18	7.0	nw.	34	nw.	22	2	7	22	7.8	27.9	7.0	1
Parkersburg	637	77	84	997.6	1,022.0	+.7	24.4	−8.1	58	1	33	−10	28	16	35	1,257	18	79	3.58	.0	1.43	16	6.5	nw.	22	sw.	1	2	9	20	7.7	26.4	4.0	1
Pittsburgh [2]	842	39	54	988.8	1,020.7	+.7	21.7	−6.5	51	9	29	−2	31	14	27	1,343	14	74	2.04	−1.0	.87	17	10.6	s.	30	nw.	9	2	9	20	7.4	15.7	2.5	1
LOWER LAKE							18.7	−5.1										82	1.95	−.6										7.2			
Buffalo [2]	768	34	96	989.5	1,019.0	+1.0	18.6	−5.3	42	9	25	−8	24	12	26	1,443	14	84	1.99	−1.3	.93	21	14.7	w.	47	sw.	28	1	11	19	7.9	14.5	2.4	1
Canton	448	10	61	1,001.7	1,019.3	+1.7	11.5	−5.1	38	12	21	−28	31	2	37	1,661	8	89	1.33	−1.2	.61	15	8.5	w.	30	w.	28	5	8	18	7.2	16.5	13.0	0
Oswego	335	71	85	1,005.8	1,018.3	+.3	19.2	−4.4	40	12	26	−9	19	13	34	1,420	12	70	2.55	−.4	.57	22	10.9	se.	27	nw.	10	2	6	23	8.3	36.1	14.0	0
Rochester [2]	523	4	69	999.7	1,019.6	+1.0	18.4	−4.8	40	9	26	−5	23	11	23	1,442	14	88	2.37	−.5	.94	24	11.7	sw.	36	sw.	28	2	10	19	7.8	18.8	7.2	0
Syracuse [2]	596	5	57	997.0	1,020.0	+1.4	17.6	−5.2	42	9	26	−17	31	9	39	1,470	12	76	1.93	−.8	.65	17	10.6	sw.	36	w.	9	3	8	20	7.7	21.3	11.9	0
Erie [4]	714	57	81	992.9	1,020.3	+1.7	22.2	−4.6	48	9	28	−2	31	16	27	1,324	16	85	2.07	−.7	.77	14	9.0	w.	24	sw.	9	4	4	23	8.0	19.6	1.0	0
Cleveland [2]	762	27	54	991.5	1,021.0	+3.0	20.0	−4.7	49	9	28	−5	31	12	27	1,391	16	84	1.66	−.8	.60	11	11.3	s.	34	w.	9	2	11	18	7.5	12.0	3.2	0
Sandusky	629	5	67	997.0	1,021.3	+2.3	21.4	−4.9	50	9	28	−1	28	15	28	1,351	------	------	1.65	−.6	.89	7	10.5	w.	29	e.	1	8	11	12	5.9	7.9	2.6	0
Toledo [2]	628	5	47	996.6	1,021.0	+1.7	18.8	−5.7	41	8	27	−8	28	11	28	1,428	14	80	2.22	+.1	1.56	9	12.6	sw.	34	ne.	1	8	9	14	6.2	7.7	.6	1
Fort Wayne [2]	857	5	34	988.5	1,021.0	+1.4	18.3	−7.1	44	8	26	−7	28	10	31	1,449	14	82	2.23	−.1	1.41	10	9.4	s.	28	s.	15	8	6	17	6.4	11.4	.6	0
Detroit [2]	730	5	77	992.6	1,020.7	+1.7	19.6	−4.5	40	12	26	−5	23	13	25	1,408	14	80	1.39	−.7	.94	8	11.3	nw.	30	nw.	9	8	8	15	6.4	5.0	2.3	1
UPPER LAKE							13.9	−3.6										81	1.23	−.6										6.4			
Alpena	609	5	89	995.3	1,019.0	+1.4	16.2	−2.9	37	12	24	−14	23	8	28	1,509	12	83	.74	−1.2	.30	12	10.8	nw.	30	sw.	28	5	10	16	7.0	11.6	5.6	0
Escanaba	612	51	72	995.6	1,019.6	+1.6	12.2	−3.2	37	12	22	−17	18	3	32	1,640	7	78	1.29	−.2	.45	14	9.8	nw.	34	s.	11	12	9	10	5.0	14.8	11.7	0
Grand Rapids [4]	707	70	244	992.9	1,020.0	+1.4	19.9	−4.6	40	8	26	−5	24	14	27	1,395	14	86	1.24	−1.1	.69	11	11.9	s.	40	ne.	1	6	4	21	7.4	22.8	5.3	0
Lansing [4]	878	5	90	986.5	1,020.3	+2.0	16.8	−5.6	39	8	24	−12	23	9	28	1,499	12	80	1.52	−.3	1.04	12	8.7	sw.	22	sw.	15	7	3	21	7.0	9.9	4.1	0
Marquette	734	44	73	990.2	1,018.6	+1.3	14.0	−2.3	36	4	22	−9	18	6	27	1,579	9	81	1.83	−.5	.49	18	9.5	w.	35	s.	11	7	7	17	6.6	21.9	24.9	0
Sault Sainte Marie [2]	614	10	52	994.6	1,018.3	+.7	9.6	−2.5	33	12	20	−24	23	0	34	1,716	6	89	1.37	−.6	.33	20	10.2	e.	34	s.	11	5	6	20	7.3	22.1	21.8	0
Chicago [2]	673	5	38	995.6	1,021.7	+2.1	18.0	−4.3	41	8	26	−10	17	10	34	1,457	12	77	1.71	−.2	1.34	8	11.5	w.	40	ne.	1	9	5	17	6.4	9.9	.6	1
Green Bay	617	5	32	997.3	1,021.7	+3.4	11.0	−4.7	36	12	21	−20	17	1	33	1,674	4	68	.55	−1.0	.25	10	9.5	sw.	31	s.	11	11	6	14	5.5	5.7	2.2	0
Milwaukee [2]	681	33	66	994.6	1,021.0	+2.4	15.0	−4.4	37	8	24	−16	18	7	37	1,546	8	72	1.07	−.7	.88	7	14.5	nw.	43	s.	11	9	7	15	6.0	16.2	6.0	0
Duluth [4]	1,133	5	47	976.3	1,020.0	+1.7	6.6	−1.3	35	5	16	−22	23	−2	34	1,808	2	92	.96	.0	.34	10	12.2	nw.	42	nw.	15	13	6	12	5.3	12.7	10.2	0
NORTH DAKOTA							8.8	+4.2										86	.49	−.1										6.3			
Fargo [2]	940	5	47	984.8	1,022.0	+1.3	3.0	−.8	37	8	14	−34	23	−8	45	1,923	−1	85	.77	+.1	.58	11	13.5	s.	42	n.	15	9	5	17	5.9	7.3	14.8	0
Bismark [2]	1,677	5	41	957.3	1,021.3	+.6	11.3	+5.0	41	8	23	−26	27	−1	47	1,669	8	87	.30	−.2	.11	10	11.4	nw.	50	nw.	15	6	8	17	6.9	6.4	8.9	0
Devils Lake	1,478	11	44	963.4	1,020.7	+1.1	5.6	+3.8	35	8	17	−30	23	−6	53	1,838	1	84	.37	−.1	.22	7	9.6	nw.	33	n.	15	9	10	12	5.8	6.6	12.6	0
Williston	1,878	42	50	949.5	1,019.6	−.4	15.1	+8.7	47	2	29	−25	27	4	40	1,550	12	86	.52	.0	.29	12	7.3	w.	28	nw.	15	7	11	13	6.5	7.0	6.2	0
UPPER MISSISSIPPI							17.9	−2.7										78	.76	−.9										5.8			
Minneapolis-St. Paul [2]	919	43	74	985.8	1,021.3	+2.0	10.0	−2.7	38	11	20	−21	23	0	44	1,702	6	81	.15	−.7	.09	6	10.8	nw.	34	w.	15	10	10	11	5.4	3.5	5.0	0
La Crosse [2]	714	5	29	993.9	1,021.7	+2.1	11.0	−3.3	40	11	22	−21	17	0	36	1,674	6	81	.07	−1.0	.04	2	9.5	nw.	40	s.	11	11	6	14	5.6	.8	2.2	0
Madison [2]	974	27	39	984.1	1,021.7	+2.1	13.2	−3.5	39	8	24	−17	18	3	34	1,604	7	75	.49	−.9	.26	7	11.7	nw.	40	n.	1	9	9	13	5.8	4.9	3.7	0
Charles City	1,015	10	51	983.7	1,023.0	+2.7	13.9	+.2	44	11	23	−14	23	5	40	1,584	------	------	.14	−.9	.07	2	7.1	nw.	24	sw.	11	15	6	10	4.8	2.2	.8	0
Moline [2]	606	6	50	999.3	1,023.4	+2.7	17.5	−2.7	45	8	26	−6	28	9	35	1,471	12	78	.84	−.6	.85	6	11.2	nw.	35	w.	15	10	8	13	5.8	3.8	T	0
Des Moines [4]	860	5	99	------	1,023.4	+3.1	20.6	+.5	56	8	30	−8	23	11	38	1,414	------	------	.06	−1.0	.06	1	11.0	nw.	36	nw.	15	12	4	15	5.7	1.0	0	0
Dubuque	699	60	79	995.6	1,022.7	+2.7	16.1	−3.0	43	8	25	−10	16	7	35	1,514	9	72	1.15	−.2	.97	8	6.5	nw.	26	ne.	1	12	6	13	5.5	8.5	1.4	0
Burlington [2]	702	4	36	995.9	1,022.7	+2.0	18.6	−3.5	44	8	27	−6	28	11	31	1,437	14	82	1.90	+.2	.02	4	11.7	nw.	38	nw.	15	9	7	15	6.3	5.7	T	0
Cairo	357	5	99	1,009.8	1,023.4	+2.1	29.2	−5.7	62	8	37	3	28	22	36	1,109	------	------	1.55	−2.2	.58	10	9.4	nw.	38	sw.	1	6	8	17	6.9	5.0	2.6	0
Peoria [2]	609	7	26	999.3	1,022.4	+1.7	20.2	−1.9	49	8	28	−6	28	12	32	1,390	14	77	1.25	−.5	1.29	6	10.6	nw.	30	nw.	15	7	12	12	6.0	4.3	.0	1
Springfield, Ill. [4]	636	5	191	998.3	1,022.7	+2.4	22.4	−2.3	55	8	30	−7	28	14	33	1,317	15	72	.56	−1.5	.86	7	12.7	nw.	30	s.	11	7	11	13	6.2	2.1	.2	0
St. Louis [4]	568	33	59	1,001.4	1,023.0	+2.3	26.6	−4.5	65	8	34	1	28	19	27	1,187	15	72	.94	−1.4	.17	7	10.5	n.	34	s.	15	7	11	13	6.3	7.1	2.2	0
MISSOURI VALLEY							21.9	−1.6										78	.50	−.6										5.8			
Columbia, Mo. [4]	784	6	66	993.6	1,023.4	+2.7	25.0	−5.9	68	8	34	−9	28	16	33	1,241	16	77	1.15	−.8	.11	7	7.6	w.	28	w.	15	9	10	12	5.4	9.8	3.2	0
Kansas City [2]	963	38	76	995.6	1,024.0	+3.0	25.1	−3.1	57	8	34	−5	23	17	32	1,235	------	------	.53	−.7	.38	6	10.9	sw.	55	ne.	1	12	8	11	5.3	6.2	1.0	0
St. Joseph [2]	967	5	51	987.1	1,024.0	+3.3	22.6	−2.9	52	8	32	−10	23	13	34	1,302	14	74	.59	−.7	.75	6	8.2	nw.	35	ne.	1	16	5	10	4.7	5.3	2.5	0
Springfield, Mo. [2]	1,324	5	50	973.9	1,023.4	+2.4	26.8	−5.5	67	8	36	−4	28	17	28	1,185	20	75	.44	−1.9	.11	7	11.2	n.	29	w.	1	8	7	16	6.0	7.1	1.0	0
Topeka [4]	987	65	87	986.8	1,024.0	+3.0	25.5	−2.1	58	8	34	−5	23	16	31	1,224	18	78	.63	−.3	1.15	6	8.6	n.	29	n.	1	11	8	12	5.6	6.6	1.2	0
Lincoln [4]	1,189	6	81	978.3	1,023.4	+2.7	22.1	−.7	54	8	31	−18	23	13	34	1,332	15	80	.81	+.2	.51	6	9.5	s.	32	nw.	15	8	9	14	6.1	10.7	.8	0
Omaha [2]	1,105	5	68	981.7	1,023.7	+2.7	20.1	−.8	52	7	30	−17	23	10	38	1,393	14	78	.29	−.4	.17	5	11.7	n.	38	w.	15	5	15	11	6.0	7.5	.8	0
Valentine	2,598	46	54	926.2	1,022.0	+1.3	22.5	+3.6	56	7	36	−15	27	10	51	1,320	14	71	.15	−.3	.12	3	8.4	w.	32	nw.	15	8	11	12	5.9	.5	T	0
Sioux City [2]	1,138	5	40	981.0	1,023.4	+2.4	17.8	+1.5	47	11	28	−23	23	7	40	1,463	------	------	.11	−.6	.07	4	11.0	nw.	39	nw.	15	7	10	14	6.0	1.3	.6	0
Huron [2]	1,301	5	41	972.6	1,022.7	+1.4	11.7	+.4	41	7	23	−24	23	1	43	1,652	9	90	.28	−.3	.10	8	12.3	nw.	48	nw.	15	5	14	12	6.8	6.3	8.5	0
NORTHERN SLOPE							24.7	+5.0										72	.68	.0										6.4			
Billings [2]	3,570	16	39	892.7	1,020.7	+.7	28.9	+6.5	60	7	38	−11	26	20	27	1,119	18	64	.46	------	.12	7	14.1	sw.	44	nw.	3	7	9	15	6.6	3.3	T	0
Havre	2,507	11	67	927.9	1,019.6	−.4	27.4	+14.5	58	6	37	−6	27	17	36	1,166	18	70	.38	−.4	.15	6	10.3	sw.	32	nw.	3	6	11	14	6.5	4.6	T	0
Helena [2]	4,124	5	43	876.4	1,024.0	+3.0	25.1	+6.4	53	6	34	−12	27	16	36	1,235	18	72	.51	.0	.17	7	9.1	w.	42	sw.	3	7	6	18	6.7	5.2	.8	0
Missoula [2]	3,263	4	32	907.2	1,026.1	+1.4	22.2	+3.6	43	21	32	−2	27	13	30	1,327	18	86	1.32	+.5	.88	10	5.0	nw.	26	sw.	2	6	8	17	6.9	4.2	T	0
Kalispell	2,973	48	56	916.7	1,024.0	+3.3	25.2	+4.8	47	22	33	−1	26	18	24	1,236	19	72	.86	−.7	.64	6	5.0	w.	26	sw.	3	6	9	16	6.8	4.0	.1	0
Miles City [2]	2,371	5	28	934.0	1,021.7	+.4	22.2	------	50	7	34	−19	27	10	38	1,328	16	75	.42	------	.15	11	------	nw.	------	------	------	9	7	15	6.3	7.2	1.3	0
Rapid City [2]	3,259	5	56	902.5	1,021.0	.0	24.2	+4.2	63	7	37	−17	27	11	46	1,266	15	72	.37	−.1	.15	9	14.3	nw.	54	nw.	15	7	10	14	6.4	4.2	.3	0
Cheyenne [2]	6,094	22	40	812.1	1,022.0	+3.0	24.6	−.9	59	7	36	−20	27	13	41	1,259	15	67	.41	.0	.15	8	13.4	nw.	46	nw.	21	7	9	15	6.3	4.7	1.9	0
Lander [2]	5,352	6	30	836.4	1,024.0	+2.0	19.6	+1.3	55	7	31	−20	27	8	38	1,411	11	69	.93	+.4	.24	8	5.1	se.	41	w.	10	10	10	11	5.5	13.5	7.5	0
Sheridan [2]	3,790	5	38	885.5	1,021.7	+1.0	25.2	+5.9	64	7	38	−21	26	12	41	1,234	16	72	1.70	+.8	.88	12	9.2	nw.	56	nw.	21	5	11	15	6.6	16.8	4.6	0
North Platte [4]	2,821	11	51	919.1	1,022.4	+1.4	26.8	+3.9	62	7	39	−12	28	15	43	1,185	16	72	.08	−.3	.05	3	6.6	w.	24	n.	18	8	10	13	6.2	1.3	.0	
MIDDLE SLOPE							29.1	−1.9										70	.80	.0										5.6			
Denver [4]	5,292	106	113	838.1	1,022.0	+3.4	30.0	+.2	65	7	41	−6	27	19	40	1,084	16	67	1.43	+1.0	.41	9	7.4	s.	34	nw.	22	11	8	12	5.5	19.2	4.9	0
Pueblo [2]	4,690	5	36	858.1	1,022.0	+3.4	27.4	−1.3	73	8	41	−29	28	13	54	1,168	20	78	1.45	+1.1	.44	10	7.2	nw.	40	nw.	21	9	10	12	5.8	20.0	3.8	0
Concordia	1,392	50	58	971.6	1,023.4	+2.1	26.0	−.4	57	11	35	−6	23	17	31	1,207	17	72	.31	−.3	.45	4	8.1	n.	24	w.	15	12	9	10	5.2	6.2	1.9	0
Dodge City [2]	2,509	5	58	931.6	1,023.0	+2.0	28.7	−.3	71	7	40	−11	28	19	42	1,126	19	72	.46	.0	.33	5	13.5	sw.	40	n.	22	10	8	13	5.6	8.3	5.4	0
Wichita [2]	1,358	52	64	972.9	1,023.4	+2.7	27.8	−3.5	60	8	37	−3	28	19	46	1,148	16	64	1.00	+.2	.68	6	12.7	n.	37	n.	1	10	9	12	5.8	12.0	3.0	0
Oklahoma City [4]	1,214	10	47	978.7	1,023.7	+3.0	32.5	−3.9	67	8	41	5	28	24	37	1,007	23	74	.56	−.6	.25	4	8.5	s.	20	n.	22	11	10	10	5.3	6.1	T	1
Tulsa [2]	674	10	60	988.6	1,024.0	------	31.3	−4.0	64	8	41	3	28	22	37	1,045	22	68	.38	−1.3	.20	3	10.2	n.	34	n.	22	9	8	14	6.0	5.7	T	0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS FOR JANUARY 1948—Continued

District and station	Elevation of instruments			Pressure			Temperature of the air									Total degree days	Mean temperature of the dew point	Mean relative humidity	Precipitation				Wind				Sky cover			Weather		
	Barometer above sea level [1]	Thermometer above ground	Anemometer above ground	Station	Sea level	Departure from normal	Mean	Departure from normal	Maximum	Date	Mean maximum	Minimum	Date	Mean minimum	Greatest daily range				Total	Departure from normal	Greatest in 24 hours	Days with 0.01 inch or more	Average hourly velocity	Prevailing direction	Maximum velocity: Miles per hour	Maximum velocity: Direction	Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
SOUTHERN SLOPE	Ft.	Ft.	Ft.	Mb.	Mb.	Mb.	°F.	°F.	°F		°F	°F.		°F.	°F.		°F.	%	In.	In.	In.		Mi.								0–10	In.	In.	
							37.7	−4.2										66	.35	−.3											5.0			
Abilene [2]	1,738	4	59	959.0	1,021.7	+1.4	39.0	−4.1	74	5	49	11	28	28	33	803	26	66	.01	−1.0	.01	1	14.3	n.	40	n.	23	13	6	12	5.3	T	.0	0
Amarillo [2]	3,676	5	42	891.6	1,021.6	+2.3	31.1	−2.0	71	8	43	3	28	19	42	1,049	21	72	.63	+.1	.16	8	12.3	sw.	42	ne.	22	9	11	11	5.2	7.3	4.0	0
Del Rio	960	63	71	986.5	1,020.7	+1.4	47.2	−5.1	80	22	58	20	28	36	45	550	32	60	.08	−.5	.04	4	8.6	n.	27	nw.	16	11	10	10	5.1	T	.0	0
Roswell	3,614	6	29	894.3	1,021.3	+2.3	33.5	−5.7	79	8	49	−10	29	18	54	973	21	67	.68	+.2	.34	5	7.7	n.	40	nw.	22	17	4	10	4.3	6.4	.0	0
SOUTHERN PLATEAU																																	
							44.9	+1.6										49	.21	−.6											2.8			
El Paso [2]	3,778	35	85	888.6	1,018.6	+.3	40.6	−3.0	71	26	55	−6	29	26	42	758	24	54	.25	−.2	.25	1	8.7	n.	34	w.	24	23	4	4	2.7	2.4	.0	0
Albuquerque [2]	4,972	5	45	839.1	1,020.0	+1.0	33.7	−.4	62	8	46	5	28	22	29	970	22	64	.18	−.2	.11	3	8.7	se.	49	se.	27	18	8	5	3.5	3.0	T	0
Flagstaff	6,907	34	48	791.1	1,021.3	+3.7	33.2	+5.8	63	7	50	1	29	17	44	989	19	60	.82	−1.4	.67	2	----	nw.	--	-------	--	17	9	5	3.7	15.1	1.2	0
Phoenix [4]	1,107	39	87	978.0	1,018.0	+.4	53.6	+2.4	81	9	69	27	29	38	36	357	28	44	T	−.8	T	0	5.6	e.	18	w.	26	20	8	3	3.0	.0	.0	0
Tucson [2]	2,555	5	39	927.5	1,016.9	−1.4	51.5	+2.4	81	9	67	25	28	36	44	417	26	40	T	−.9	T	0	6.6	se.	33	ne.	28	21	9	1	2.5	.0	.0	0
Yuma	142	9	54	1,012.5	1,017.6	− .7	56.8	+2.4	83	8	71	26	29	43	42	262	25	30	.00	−.4	.00	0	6.3	n.	26	nw.	19	25	5	1	1.7	.0	.0	0
MIDDLE PLATEAU																																	
							31.1	+3.5										65	.23	−.7											4.6			
Reno [2]	4,527	20	52	866.9	1,023.7	+2.4	36.0	+5.1	68	23	56	5	26	16	55	902	19	54	.01	−1.5	.01	1	6.1	s.	40	e.	2	16	9	6	3.9	T	.0	0
Winnemucca	4,339	5	56	872.7	1,023.7	+1.0	34.4	+5.8	61	23	49	5	27	20	41	949	21	60	.29	−.7	.17	4	7.5	ne.	26	sw.	2	13	10	8	4.7	.1	.0	0
Modena	5,473	10	46	836.1	1,022.0	+1.3	29.4	+2.7	57	23	43	−2	28	16	37	1,104	----	---	Tr	−.8	T*	0	7.8	w.	27	ne.	18	17	11	3	3.3	.1	.0	0
Salt Lake City [2]	4,357	32	58	872.0	1,025.1	+2.7	30.1	+2.6	55	7	39	4	19	21	28	1,084	23	75	.34	−.6	.19	5	6.8	se.	25	s.	7	10	6	15	5.7	3.7	.0	0
Grand Junction [2]	4,602	5	26	864.2	1,026.4	+5.4	25.4	+1.4	48	9	36	−11	28	15	29	1,227	18	72	.50	−.1	.35	4	5.4	e.	20	ne.	18	11	7	13	5.3	5.6	1.6	0
NORTHERN PLATEAU																																	
							30.4	+3.3										76	1.48	−.1											6.3			
Baker [4]	3,471	36	54	901.5	1,026.1	+3.4	29.6	+4.7	55	6	39	9	13	20	28	1,096	21	74	.76	−.6	.28	10	6.2	se.	25	sw.	6	9	6	16	6.1	6.1	.0	0
Boise [2]	2,739	5	49	926.9	1,026.1	+2.4	33.0	+5.1	58	7	42	12	28	24	26	993	26	74	.81	−.9	.33	5	9.2	se.	27	e.	5	10	6	15	5.8	.5	.0	0
Pocatello [2]	4,478	5	31	867.9	1,026.8	+3.8	26.3	+4.0	55	7	36	−5	27	16	33	1,197	19	74	.80	−.5	.38	7	9.1	sw.	36	n.	25	7	8	16	6.4	.9	.0	0
Spokane [2]	1,929	6	51	953.6	1,025.1	+4.1	27.5	0.0	40	8	34	11	31	22	22	1,162	23	80	2.72	+.6	1.03	11	6.3	sw.	31	sw.	2	7	7	17	6.6	8.5	1.0	0
Walla Walla	991	57	65	988.8	1,026.1	+3.4	34.9	+2.2	57	1	40	19	28	30	26	931	----	---	2.25	+.3	1.42	10	5.5	s.	28	sw.	2	6	10	15	6.7	2.7	.0	0
Yakima [2]	1,076	4	54	985.4	1,026.1	+5.1	31.2	+3.8	60	23	41	11	28	22	36	1,049	24	78	1.52	+.6	1.19	5	----	w.	--	-------	--	11	4	16	6.0	2.3	.0	0
NORTH PACIFIC COAST																																	
							40.9	+.7										81	5.71	−.9											7.1			
North Head	211	5	55	1,014.6	1,022.7	+5.1	43.7	+1.6	57	18	49	33	31	39	21	661	36	74	5.21	−3.6	.98	16	12.3	se.	63	s.	1	6	10	15	6.3	T	.0	1
Seattle [4]	125	90	321	1,018.6	1,023.4	+5.1	41.4	+.6	53	28	46	30	28	37	23	731	34	81	3.97	−1.0	.80	15	8.2	se.	34	sw.	7	5	5	21	7.4	T	T	0
Tacoma	194	172	201	1,015.9	1,023.4	+4.8	39.4	+.6	52	7	44	28	28	35	21	794	----	---	4.79	−1.4	1.14	16	8.4	s.	34	s.	1	5	7	19	7.2	2.3	.5	0
Tatoosh Island	86	5	61	1,018.3	1,021.7	+5.8	42.7	+1.5	50	7	46	37	11	40	9	689	38	83	7.93	−3.9	2.00	18	20.2	e.	61	s.	1	6	10	15	6.6	T	.0	2
Medford [2]	1,329	29	58	975.3	1,024.7	+4.4	37.4	−.5	58	6	47	20	29	28	31	853	32	80	4.80	+2.5	1.54	8	----	s.	--	-------	--	4	6	21	7.5	T	.0	0
Portland, Oreg. [4]	154	68	106	1,018.3	1,024.0	+4.7	41.6	+2.2	54	7	47	28	19	36	18	725	34	80	6.72	+.1	2.64	12	5.7	nw.	26	s.	1	7	7	17	6.7	T*	.0	1
Roseburg	510	45	76	1,005.1	1,024.0	+4.0	40.0	−1.2	60	6	46	23	27	34	30	775	36	87	6.59	+1.3	2.32	11	3.6	nw.	23	sw.	2	2	4	25	8.2	.0	.0	0
MIDDLE PACIFIC COAST																																	
							50.6	+3.5										70	2.88	−2.2											4.8			
Eureka	60	72	88	1,020.3	1,022.7	+2.4	47.4	+.5	66	13	55	33	18	40	28	545	42	80	8.23	+1.1	2.70	11	5.4	se.	25	s.	4	9	5	17	6.2	0	0	0
Red Bluff	353	5	26	1,008.5	1,021.3	-----	50.4	+4.6	79	23	62	26	29	38	36	454	34	56	1.78	−3.0	.86	6	8.0	nw.	35	se.	7	13	9	9	4.8	.0	.0	0
Sacramento [4]	66	92	115	1,018.6	1,021.0	+.7	49.8	+4.0	69	23	61	30	28	39	35	468	38	70	.51	−3.2	.28	4	5.8	n.	29	nw.	25	19	4	8	3.5	.0	.0	0
San Francisco [4]	155	112	132	1,015.2	1,021.0	+1.0	54.7	+4.8	75	23	62	42	28	48	26	312	42	74	1.00	−3.5	.39	5	5.2	e.	18	w.	31	13	7	11	4.7	.0	.0	0
SOUTH PACIFIC COAST																																	
							55.2	+3.8										61	T	−2.3											3.5			
Fresno [2]	327	5	34	1,008.5	1,021.0	.0	51.2	+5.7	73	24	66	29	30	36	39	428	36	60	T	−1.7	T	0	3.4	se.	16	nw.	25	17	7	7	3.8	.0	.0	0
Los Angeles	338	236	263	1,006.4	1,018.6	.0	58.6	+4.0	83	10	69	39	28	48	29	219	38	56	T	−3.1	T	0	5.8	ne.	17	e.	25	[illegible]	6	4	2.9	.0	.0	0
San Diego [2]	87	20	55	1,015.2	1,018.3	.0	55.7	+1.7	80	16	67	36	28	45	35	294	42	68	T	−2.1	T	0	5.0	n.	17	s.	25	17	10	4	3.7	.0	.0	0
PANAMA CANAL																																	
Balboa Heights [4]	118	6	97	-------	1,010.0	-----	80.4	+.5	91	31	88	69	24	72	20	0	72	81	1.26	+.2	----	6	7.7	nw.	21	nw.	14	18	10	3	4.2	.0	.0	0
Cristobal [4]	23	37	92	-------	1,010.6	-----	80.3	−.2	87	23	84	72	24	77	13	0	73	79	.83	−2.4	----	13	13.0	n.	26	n.	15	7	14	10	5.8	.0	.0	0
ALASKA																																	
Anchorage [2]	132	6	44	997.0	1,002.0	-----	18.0	+6.4	48	15	25	−8	10	11	31	1,460	16	84	1.04	+.2	.25	15	6.1	n.	31	se.	15	2	7	22	8.0	14.9	9.8	0
Fairbanks [2]	454	5	63	989.8	1,008.1	-----	−4.4	+6.9	39	26	5	−36	10	−13	48	2,149	−4	94	.47	−.5	.32	8	4.0	nw.	27	s.	26	5	5	21	7.4	8.6	14.6	0
Juneau [2]	80	6	30	1,009.5	1,010.2	-----	32.6	+3.2	43	18	36	14	10	29	16	1,001	29	84	6.77	+1.8	2.74	22	9.4	e.	45	se.	1	1	1	29	9.0	9.0	.5	8
Nome [2]	22	10	75	1,004.7	1,005.4	-----	1.9	−1.5	33	20	10	−30	7	−6	40	1,953	0	94	1.39	+.3	.30	12	14.1	e.	54	s.	31	9	7	15	6.0	14.2	28.2	0
Annette Island	113	5	53	1,009.5	1,013.9	-----	36.8	+.5	46	20	41	26	4	32	12	876	34	88	14.22	+3.3	2.84	25	----	se.	--	-------	--	1	3	27	8.6	12.4	0	0
Barrow	29	12	31	1,014.2	1,014.9	-----	−17.8	−1.2	23	26	−10	−37	14	−26	49	2,570	−20	88	.38	+.2	.22	7	10.4	e.	38	w.	18	14	7	10	4.8	5.0	19.4	0
Bethel	38	5	31	1,001.4	1,003.1	-----	4.6	−2.3	39	19	11	−36	3	−2	27	1,873	4	86	.59	−.3	.08	16	----	ne.	38	se.	31	10	5	16	5.8	5.6	6.3	0
Cordova	48	5	32	1,000.7	1,002.7	-----	30.0	+3.1	44	17	37	0	10	23	37	1,087	29	92	12.19	+3.5	2.66	27	----	e.	55	e.	1	3	0	28	8.5	21.3	1.5	0
Galena	139	4	66	1,001.0	1,006.1	-----	−6.4	------	30	17	2	−51	8	−15	42	2,213	----	---	.77	-------	.25	13	----	n.	48	e.	31	7	7	17	6.6	9.2	23.2	----
Gambell	32	5	32	1,006.1	1,007.1	-----	−1.0	−3.4	32	31	4	−18	26	−6	36	2,048	−2	94	.66	−.1	.22	12	20.1	ne.	51	n.	20	2	11	18	7.5	6.5	15.4	0
Kotzebue	16	4	31	1,007.5	1,008.1	-----	−6.4	−1.8	30	22	2	−36	11	−14	38	2,215	−13	70	.53	.0	.14	10	14.5	e.	53	e.	31	11	8	12	5.4	5.4	16.2	0
McGrath	338	4	28	992.6	1,006.1	-----	−4.1	+3.0	33	22	7	−45	4	−15	45	2,142	−2	86	1.82	+.8	.73	13	----	nw.	25	n.	8	2	6	23	8.0	24.6	31.0	0
Northway	1,721	4	31	994.1	1,010.5	-----	−8.6	+5.8	25	18	−1	−35	5	−16	27	2,280	−10	83	.49	+.1	.13	9	3.2	nw.	27	nw.	18	2	2	27	8.5	4.9	21.9	0
HAWAII																																	
Honolulu [4]	38	86	100	1,013.5	1,014.9	-----	70.1	−0.8	80	19	75	60	24	66	14	1	61	74	8.42	+4.6	2.21	17	8.7	ne.	37	ne.	24	8	10	13	6.2	.0	.0	1

[1] Height of barometer cistern above mean sea level on January 1, 1900, or when station was first established since January 1, 1900. When station is moved to new location or airport, the pressure is reduced to the original elevation for homogeneity. These elevations do not represent the present station elevation in most cases.

[2] Data are from airport records. Pressures adjusted to original elevations according to note 1.

[3] Barometric, hygrometric, wind, character of day, and average cloudiness data from airport records; remainder from city office records.

[4] Barometric and hygrometric data from airport records; remainder from city office records.

[5] Barometric, temperature, degree day, and hygrometric data from airport; remainder from city office records.

[6] Bihourly hygrometric data.

NOTE.—Unless otherwise indicated, data in table are city office records.

SEVERE LOCAL STORMS FOR JANUARY 1948

[The table hereunder contains such data as have been received concerning severe local storms that occurred during the month. A revised list will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Iowa, southeastern portion	Dec. 31–Jan. 1	Night of Dec. 31–morning of Jan. 1.				Ice and snow storm	Storm piled 6 to 10 inches of snow on sheet of ice; communications and transportation facilities crippled in 12 counties. Freezing rain began on night of Dec. 31, accompanied by winds up to 40 m. p. h. Power and telephone lines and tree limbs broken by weight of ice and snow. About 50 towns cut off from telephone service; damage to lines estimated in excess of $350,000. Communications partially revived via short wave radio in Burlington, Fort Madison, Clinton, and Keokuk. Several communities without power. Train and plane services disrupted. Highways hazardous for several days. At least 1 death attributed indirectly to storm, as well as numerous accidents.
North Union to Mantee, Miss.	1	2–3:30 a. m.		1	$50,000	Tornado	North of Kosciusko, storm moved northeastward over generally wooded areas of Attala County to town of Mantee, where 1 person was killed and 1 injured. Approximately 10 homes destroyed, and several outbuildings and barns.
Salem, Ind	1	11:30 a. m	100	0	20,000	do	Path southwest to northeast: 2 miles long.
Pendleton County, Ky	1	3 p. m	100	0	100,000	Small tornado	Damage mostly to buildings, woodlots, and corn still in shock.
Clermont, Clinton, and Fayette Counties, Ohio.	1	4 p. m	67	0	100,000	Tornado	Damage reported in scattered areas from near Newtonsville in Clermont County, northeastward across Clinton County, to Washington Courthouse in Fayette County. Damage evidently caused by a tornado, which dipped to ground here and there, or to a series of smaller tornadoes. One factory building and a number of houses unroofed; several barns and smaller farm buildings destroyed; trees twisted off; power and telephone lines damaged; corn in shock scattered.
Ohio, northwestern counties	1	All day		6	100,000	Glaze	Telephone and power lines and poles down, due to coating of ice; number of communities without electric and telephone service for about 12 hours; trees damaged; 6 persons killed in traffic accidents.
Indiana, northern portion	1					do	Worst storm in years. Severe damage. Many poles and wires down, due to ice and wind.
Wisconsin, southeastern portion.	1					Heavy snow and high winds.	10- to 13-inch snowfall, Milwaukee and Waukesha Counties and southern portions Washington and Ozaukee Counties; 4 to 6 inches elsewhere in area. Drifts to 5 feet. Trains late, some canceled; inter-city bus service discontinued. Milwaukee City transportation halted several hours. Many people stranded overnight. Traffic mostly resumed on 2d.
Calhoun, Doddridge, Harrison, Marshall, Pleasants, Ritchie, Taylor, Tyler, Wetzel, Wirt, and Wood Counties, W. Va.	1–2	Most of 1st and a. m. of 2d.				Heavy rains	Small streams overflowed locally, blocking highways, as result of high water and landslides.
Pennsylvania, southeastern portion of.	1–2					Glaze	Much damage to trees and power and telephone lines. Service disrupted in towns of Center Valley, Fredericksburg, and New Tripoli on 1st. Electricity restored by 7th in New Tripoli, but no telephone service through end of January. Many homes in towns of Grantville, Mauch Chunck, Palmerton, Pine Grove, and West Chester without light, heat, or telephone service.
Dadeville, Ala	2	2 a. m			5,000	Thundersquall	Three miles south of town. Blew down several flimsy barns and outhouses; unroofed 1 residence; blocked highway with fallen trees; blew down power line, causing electrocution of some cattle.
Montgomery, Ala	2	2 a. m			1,500	do	About 100 old telephone poles blown down north of city. Several spans of power line blown down west of city.
Maine (southern and eastern portions), Massachusetts,, Rhode Island, and Connecticut.	2					Snow, sleet, and rain	Snowfall varying from 5 to 12 inches, fell on hard-packed, frozen surfaces, causing extremely hazardous conditions on streets, highways, and sidewalks.
South Dakota, eastern portion.	15	Daytime				Wind	High winds, accompanied by blowing light snow and rapidly falling temperatures, hampered transportation and delayed or cancelled bus, plane, and rail schedules. Some schools closed.
Massachusetts, central and eastern portions; Maine, southern portion.	21–22					Snow, rain, and sleet	Conditions practically a repetition of those that existed during and after the storm of Jan. 2. In eastern portion of area, especially coastal sections, moderately heavy rain during the afternoon of 21st collected in city streets due to clogged catch basins, and crippled transportation.
Charleston, W. Va., near	22	Late afternoon				Electrical	Transmitting tower of Radio Station WKNA struck by lightning.
Entire State of W. Va	22–24					Freezing rains changing to moderate to heavy snows	Roads blocked temporarily, principally in mountains.
Baltimore, Md	24	7:30 a. m.-midnight.				Snow and sleet	Heavy snow, totaling 5 inches, caused tie-up in traffic; minor accidents, and falls on slippery streets.
Montezuma, near, Colo	24	P. m.		1		Snow slide	Between Shoe Basin mine and Montezuma; 2 other persons injured.
Massachusetts, Rhode Island, and Connecticut	24–25					Moderate to heavy snow and strong northeast winds	Accumulation of snow in this storm brought the amount remaining on the ground to all-time record at Providence, R. I., and Hartford, Conn.; it was within 1 inch of the record at Boston, Mass.
Northern South Carolina	24–31	At intervals		2		Freezing rain, sleet, snow, and glaze	Falls of solid precipitation and glaze at frequent intervals, most generally on the 24th, 28th, and 31st. Icy roads responsible for traffic delays and many wrecks, most of them of minor nature. The heaviest snow and sleet falls occurred in Piedmont area. Of the 2 recorded fatalities, 1 was due to motor accident, the other, to exposure.
Loveland Pass, Colo	25	4 p. m		2		Snow slide	Slide crossed Switchback Trail on eastern slope of Loveland Pass, striking a ski party.
Most of W. Va., except extreme northwest portion	31–Feb. 1					Heavy snows	Many roads blocked, causing suspension of bus services and making all automobile travel extremely hazardous.

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LATE STORM REPORTS FOR OCTOBER AND DECEMBER 1947

[The table hereunder contains such data as were received concerning severe local storms that occurred during these months. A revised list will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
	October						
Jefferson County, Mo.	17	About 4 p. m.	[1] 1		$4,000	Heavy hail	Storm at De Soto damaged composition shingle roofs, greenhouse glass, and late gardens. Hailstones mostly ¾ to 1½ inch in diameter, with a few as large as golf balls. North half of town hardest hit. Heavy rain accompanied hail which lasted about 30 minutes.
	December						
Erath County, Tex.	3	7 p. m.	440		1,000	Wind	Principal damage to buildings in Thurber.
Honolulu and vicinity, T. H.	18–19					High winds	Few roofs, some trees damaged; utility services interrupted short period in some areas by falling tree limbs.
Bell County, Tex.	31	2:55 p. m.	1,760		50,200	Hail and wind	Storm at Temple demolished 1 house, unroofed several others, and blew in several large windows; 3 or 4 automobiles struck by trees or falling objects. One flock of chickens killed. Heavy black cloud with organge hue. Wind estimated to reach 60 m. p. h.
McLennan County, Tex.	31	3 p. m.	880	0	2,000	Tornado, hail, and wind.	Two automobiles blown over on highway; small grain, peas, and clover leveled at Ross.
Waco, Tex.	31	3:10 p. m.			6,450	Wind	Damage to 2 airplanes, $300; several others damaged slightly; roofing off hangar, $700; damage to other buildings on field, $5,250. Sharp rise in barometer from 28.98 to 29.18 inches and fall to 29.10 inches in about one minute of time. Reaction of persons in building similar to a drop of 200 feet in an airplane.
Blanco County, Tex.	31	3:30 p. m.	[1] 12			Hail and wind	Shingles blown from some roofs at Blanco.
Bell County, Tex.	31	4 p. m.	200	0	50,000	Tornado, hail, and wind.	Buildings unroofed and small trees blown down at Belton.

[1] Miles instead of yards.

SOLAR RADIATION DATA FOR JANUARY 1948

[Solar Radiation Investigation Section, I. F. HAND in Charge]

Explanation of Tables 1 and 2 and references to descriptions of instruments, stations, and methods of observation, and to summaries of data, are given in the MONTHLY WEATHER REVIEW, vol. 72, No. 1, January 1944, p. 43. A list of phyrheliometric stations is given on page 45 of that issue. An explanation of the formula used in computing the air mass values for each station listed in Table 1 appears in vol. 75, No. 3, March 1947, p. 47.

Measurements of total solar and sky radiation received on a horizontal surface at the Upper Columbia Snow Laboratory (near Summit, Mont.) will be included in Table 2, beginning with this issue. The station is located at 48°22′ N. lat. and 113°21′ W. long. Publication of data for the Central Sierra Snow Laboratory, at Soda Springs, Calif., is also resumed with this issue. These data are obtained through a cooperative project conducted by the Corps of Engineers of the U. S. Army and the Weather Bureau.

Table 3, included this month, gives the values of solar and sky radiation plus the radiation reflected from the ground, as received on a vertical surface facing south at Blue Hill, Mass. It lists measurements for the period from March 26, 1945, to December 31, 1947. Current values are below Table 2, where they will appear monthly.

TABLE 1.—*Solar radiation intensities during January 1948*

[Gram calories per minute per square centimeter of normal surface]

Date	Sun's zenith distance: A. M. 78.7°	75.7°	70.7°	60.0°	0.0°	P. M. 60.0°	70.7°	75.7°	78.7°	Vapor pressure 7:30 a. m.[1]	1:30 p. m.[1]
MADISON, WIS.	Air mass 4.81	3.84	2.88	1.92	*0.96	1.92	2.88	3.84	4.81		
January	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
6	1.11	1.14	1.31		1.53					2.7	2.9
14	.64	.71	1.06							.7	.5
15	.84	.98	1.11							2.5	4.0
16	.98	1.08	1.19		1.57					1.1	.8
17	.92	1.03	1.14							.4	.6
19	.96	1.11	1.25		1.61					2.9	1.1
22	.81	1.02	1.16		1.58					.7	1.0
23	1.01	1.14	1.26		1.61					.4	.9
27	.90	1.04	1.21		1.55					.5	.6
28	.81	.98	1.16		1.46					.4	.8
29	.65	.92	1.07		1.42					1.2	1.9
Means	.88	1.01	1.17		1.54						
Departures	+.02	.00	+.02		+.03						
LINCOLN, NEBR.	Air mass 4.77	3.81	2.86	1.91	*0.95	1.91	2.86	3.81	4.77		
January	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
6		1.04	1.22							3.5	4.0
7	0.83	.98								5.3	6.9
16							1.20	1.09		1.2	1.2
17	.85	.96								1.3	2.0
19	.90	1.02	1.20				1.22	1.11	1.03	1.2	2.7
20	.83	.96								3.5	5.6
21	.96	1.24								3.5	2.3
27	.92	1.04	1.18				1.18	1.06	.96	.7	1.2
28	.96	1.04	1.18	1.40		1.37	1.20	1.06	1.04	.7	1.5
29			1.13	1.30		1.29	1.02	.89	.69	1.6	3.3
Means	.89	1.04	1.18	(1.35)		(1.33)	1.16	1.04	.93		
Departures	−.03	−.01	−.01	−.04		−.06	−.03	−.01	.00		
CLIMAX, COLO.	Air mass 3.24	2.59	1.94	1.29	*0.65	1.29	1.94	2.59	3.24		
January	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1						1.54	1.40				
6	1.31	1.41	1.50	1.57		1.57	1.46	1.36	1.27		
7							1.42	1.32	1.25		
9						1.54	1.45	1.34	1.26		
10	1.26	1.37	1.45	1.58		1.58	1.43				
13						1.56	1.40	1.30	1.23		
14		1.34	1.45	1.57		1.57	1.44	1.32	1.27		
15			1.41	1.56							
19			1.48	1.58							
21			1.41								
27				1.55				1.28	1.15		
28		1.36		1.59		1.59	1.44	1.34	1.27		
29				1.56		1.59	1.43	1.33	1.23		
30				1.57		1.54	1.36	1.23	1.18		
Means	(1.28)	1.37	1.45	1.57		1.57	1.42	1.31	1.23		
Departures	+.01	+.03	+.01	.00		+.02	+.00	+.01	+.01		

TABLE 1.—*Solar radiation intensities during January 1948*—Con.

Date	Sun's zenith distance: A. M. 78.7°	75.7°	70.7°	60.0°	0.0°	P. M. 60.0°	70.7°	75.7°	78.7°	Vapor pressure 7:30 a. m.[1]	1:30 p. m.[1]
TABLE MOUNTAIN, CALIF.	Air mass 3.76	3.01	2.26	1.51	*0.75	1.51	2.26	3.01	3.76		
January	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
1				1.49							
2	1.14	1.22	1.33	1.46							
3				1.49							
4				1.48							
6				1.47							
7				1.46							
8	1.10	1.20	1.30	1.42							
11				1.48							
13				1.54							
14	1.27	1.35	1.45	1.58							
15				1.56							
17				1.48							
18				1.51							
19				1.58							
20	1.21	1.30	1.40	1.53							
21				1.52							
22				1.47							
24				1.54							
29				1.50							
31	1.18	1.27	1.39	1.52							
Means	1.18	1.27	1.37	1.50							
Departures	−.01	−.01	−.01	−.01							
BOSTON, MASS.	Air mass 4.96	3.96	2.97	1.98	*0.99	1.98	2.97	3.96	4.96		
January	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
8	0.70	0.85	0.89							3.1	3.3
15	.77	.81	.97				0.38	0.58	0.41	1.2	1.4
19	.78									.7	1.7
20	.57	.61	.63	0.94						1.8	3.0
28	.59	.89	1.12	1.13		1.13	1.09	.83	.73	1.3	1.6
30	.87	1.13	1.21							.6	1.2
Means	.71	.86	.96	(1.04)		(1.13)	(0.74)	(0.70)	(0.57)		
Departures	−.05	+.01	−.03	−.10		−.05	−.24	−.18	−.20		
BLUE HILL, MASS.	Air mass 4.86	3.89	2.92	1.94	*0.97	1.94	2.92	3.89	4.86		
January	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
8	0.70	1.01						0.88	0.79	3.0	3.1
10		1.13					1.29	1.18	1.08	2.6	1.8
11	1.09	1.18	1.30				1.28	1.18	1.09	.8	1.7
20	.67	.78	.93					.80	.74	1.6	2.7
26							1.33	1.22	1.18	1.7	1.7
28							1.18	.98	.86	1.0	1.3
30	1.11	1.21	1.30							.6	.7
31							1.29	1.18	1.10	.6	1.3
Means	.89	1.06	1.18				1.27	1.06	.98		
Departures	−.05	+.02	+.03				+.10	+.03	+.05		
	RATIO, BOSTON/BLUE HILL ON COMPARABLE DATES										
	0.86	0.86	(0.82)				(0.92)	(0.85)	(0.85)		

See footnotes at end of table.

TABLE 1.—*Solar radiation intensities during January 1948*—Con.

Date	Sun's zenith distance									Vapor pressure	
	A. M.				0.0°	P. M.					
	78.7°	75.7°	70.7°	60.0°		60.0°	70.7°	75.7°	78.7°	7:30 a. m.[1]	1:30 p. m.[1]

DECEMBER DATA FOR MADISON WIS.

	Air mass										
	4.81	3.84	2.88	1.92	*0.96	1.92	2.88	3.84	4.81		
December	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mb.*	*mb.*
11	0.87	0.94	1.07	.....	1.41	.....	.....	.....	.....	1.8	2.5
16	.90	1.04	1.18	.....	1.54	.....	.....	.....	.....	1.4	1.9
17	.88	1.02	.....	.....	.....	.....	.....	.....	.....	3.5	3.3
23	.91	1.01	1.11	.....	1.35	.....	.....	.....	.....	2.5	3.3
24	.....	.36	.52	.....	.....	.....	.....	.....	.....	1.6	2.7
26	.98	1.10	.....	.....	.....	.....	.....	.....	.....	2.7	3.5
27	.91	1.02	1.15	.....	1.56	.....	.....	.....	.....	3.1	4.6
Means	.91	.93	1.01	.....	1.46	.....	.....	.....	.....	.....	.....
Departures	.00	−.10	−.17	.....	−.06	.....	.....	.....	.....	.....	.....

*Extrapolated.
[1] 75th meridian time.

TABLE 2.—*Daily totals and weekly means of (a) solar radiation (direct+diffuse) received on a horizontal surface, and of (b) solar and sky radiation plus the radiation reflected from the ground as received on a vertical surface facing south at Blue Hill, Mass.*

[Gram calories per square centimeter]

Date	Washington, D. C.	Madison, Wis.	Lincoln, Nebr.	New York, N. Y.	Fresno, Calif.	Fairbanks, Alaska	Columbia, Mo.	Boston, Mass.	Nashville, Tenn.	La Jolla, Calif.	Riverside, Calif.	Blue Hill, Mass.	Newport, R. I.	Salt Lake City, Utah.	Put-in-Bay, Ohio	State College, Pa.	Davis, Calif.	Toronto, Canada	Ithaca, N. Y.	Boulder, Colo.	East Wareham, Mass.	Honolulu, Hawaii	Pearl Harbor, Hawaii	East Lansing, Mich.	Summit, Mont.	Soda Springs, Calif.
1948	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Jan. 1	2	23	86	12	233	----	22	54	109	236	266	90	44	----	7	0	66	38	31	239	74	417	401	----	33	53
Jan. 2	31	111	249	22	204	1	232	7	218	147	248	36	25	41	24	27	55	54	55	148	18	362	356	----	34	41
Jan. 3	141	92	237	216	258	2	190	69	222	200	257	91	132	164	36	136	195	48	65	202	78	235	382	----	48	76
Jan. 4	36	145	236	23	234	4	150	38	141	79	229	62	80	25	48	16	99	47	85	208	79	201	278	----	21	17
Jan. 5	146	91	157	118	234	9	163	82	176	119	199	92	128	164	55	56	241	134	38	214	119	398	331	72	106	103
Jan. 6	30	212	260	15	211	1	279	39	236	116	287	87	42	166	194	36	109	19	57	215	33	457	399	177	14	102
Jan. 7	223	178	220	112	165	5	254	44	247	113	278	68	128	75	193	171	49	198	89	100	95	471	453	147	15	8
Means	87	122	206	74	220	4	184	48	193	144	252	75	83	106	80	63	116	77	60	190	71	363	371	----	39	57
Departures	−72	−6	+36	−39	+76	−2	+36	−53	+84	−95	+2	−61	−53	−36	−16	−33	−26	−2	−41	−1	−72	----	----	----	----	----
Jan. 8	144	114	232	150	118	3	201	166	161	196	276	196	192	68	96	94	241	65	99	214	232	339	320	71	39	116
Jan. 9	108	78	168	78	192	3	237	48	159	240	263	66	59	181	46	61	228	53	21	61	40	456	416	64	124	270
Jan. 10	252	141	61	234	102	10	57	143	274	277	262	195	254	55	270	246	203	177	160	244	223	381	436	199	131	224
Jan. 11	249	72	227	226	155	13	23	205	227	181	303	238	253	235	240	234	279	183	144	215	244	458	453	147	102	277
Jan. 12	29	94	152	66	265	2	183	66	11	193	312	90	100	70	75	50	280	34	43	88	95	240	302	89	159	284
Jan. 13	20	198	209	13	278	4	151	1	67	309	325	23	15	215	114	59	275	150	60	238	20	471	445	125	104	284
Jan. 14	140	203	210	228	280	11	274	49	228	298	329	87	72	188	157	156	283	184	165	231	32	423	399	20	149	283
Means	135	129	180	142	198	7	161	97	161	242	296	128	135	145	142	128	256	122	99	180	127	395	396	129	116	248
Departures	−17	−6	−2	+16	+40	−2	−1	−12	+24	−14	+40	−20	−25	−7	+18	−14	+65	+36	−18	−18	−25	----	----	+29	----	----
Jan. 15	262	128	99	173	286	3	206	193	267	313	325	258	258	162	115	191	258	35	192	107	230	353	300	84	92	285
Jan. 16	231	247	266	122	228	10	194	95	20	302	267	155	88	202	233	69	260	133	100	141	124	427	401	124	155	282
Jan. 17	82	226	171	70	274	*T	292	22	185	296	319	55	44	128	212	57	268	188	59	78	45	159	171	165	85	286
Jan. 18	287	192	133	228	266	6	216	109	281	268	312	130	131	----	230	260	281	200	----	38	85	422	407	232	132	284
Jan. 19	230	237	301	152	281	17	263	145	156	326	364	257	278	----	136	225	259	48	162	275	267	314	198	142	107	298
Jan. 20	131	148	271	154	265	3	264	190	171	331	319	229	234	----	199	241	260	160	156	147	240	94	151	219	100	280
Jan. 21	141	167	263	59	265	----	280	4	226	290	303	36	30	----	216	102	269	38	69	249	25	294	170	145	23	279
Means	195	192	215	137	266	7	245	108	187	304	316	160	152	----	192	164	265	115	123	148	145	295	257	159	99	285
Departures	+38	+37	+27	+13	+73	−6	+59	−14	+36	+37	+29	+1	−10	----	+41	+28	+30	+7	+4	−57	−13	----	----	+23	----	----
Jan. 22	174	259	255	94	276	11	172	44	115	251	312	62	68	58	212	156	274	110	119	68	74	171	220	180	74	280
Jan. 23	103	279	250	105	283	8	369	84	136	208	328	111	96	24	307	209	288	222	205	113	80	123	129	261	76	311
Jan. 24	15	216	199	27	295	3	278	43	260	147	318	78	56	31	37	32	295	40	59	83	70	388	380	123	114	313
Jan. 25	252	168	147	222	291	10	301	112	192	30	64	140	188	70	258	150	279	204	64	102	140	184	203	249	91	316
Jan. 26	316	244	207	241	301	13	45	232	134	206	369	280	298	277	226	232	320	128	55	110	279	368	358	184	237	337
Jan. 27	63	285	317	184	314	1	275	134	50	348	386	169	199	286	251	236	318	200	88	299	166	170	135	146	122	329
Jan. 28	277	253	315	264	309	7	344	245	215	305	317	286	321	256	327	245	260	230	76	296	293	396	404	263	160	327
Means	172	243	241	163	296	8	255	128	157	214	299	161	175	143	231	180	290	162	95	153	157	257	261	202	125	316
Departures	−7	+61	+19	+6	+83	−12	+12	−20	−26	−51	+42	−18	0	−41	+69	+12	+54	+21	−43	−65	−20	----	----	+64	----	----

ACCUMULATED DEPARTURES ON JANUARY 28, 1948

	−406	+602	+560	−28	+1,904	−154	+952	−693	+826	−861	+791	−749	−616	----	+784	−49	+861	+434	−686	−987	−910	----	----	+812	----	----

VERTICAL SURFACE MEASUREMENTS FOR BLUE HILL, MASS., FOR JANUARY 1948

Date	1	2	3	4	5	6	7	Mean	8	9	10	11	12	13	14	Mean	15	16	17	18	19	20	21	Mean	22	23	24	25	26	27	28	Mean
Gm. cal/cm²	70	28	70	38	97	60	73	62	465	66	458	612	72	18	124	259	611	187	38	245	580	523	24	315	41	130	55	152	605	195	628	258

*Trace, less than 0.6.

TABLE 3.—*Daily totals and weekly means of solar and sky radiation, plus the radiation reflected from the ground, as received on a vertical surface facing south at Blue Hill, Mass., for the period from Mar. 26, 1945, to Dec. 31, 1947.*

[Gram calories per square centimeter]

1945	January		February		March		April		May		June		July		August		September		October		November		December	
	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.
First week							2	69	[2]30	70	4	168	2	220	30	313	3	432	1	73	29	247	3	59
							3	178	1	151	5	92	3	224	31	303	4	407	2	26	30	344	4	39
							4	64	2	292	6	146	4	235	1	160	5	396	3	511	31	411	5	164
							5	97	3	295	7	194	5	216	2	238	6	376	4	547	1	528	6	15
							6	398	4	98	8	166	6	195	3	247	7	389	5	491	2	220	7	12
							7	404	5	196	9	210	7	259	4	258	8	388	6	153	3	318	8	500
							8	400	6	182	10	144	8	230	5	312	9	377	7	61	4	2	9	347
Mean								230		184		160		226		262		395		266		296		162
Second week							9	400	7	198	11	155	9	247	6	75	10	198	8	476	5	308	10	30
							10	370	8	188	12	241	10	181	7	51	11	143	9	213	6	528	11	583
							11	395	9	304	13	157	11	302	8	303	12	270	10	522	7	258	12	598
							12	373	10	42	14	233	12	236	9	305	13	426	11	164	8	421	13	408
							13	345	11	219	15	183	13	279	10	317	14	179	12	142	9	178	14	63
							14	342	12	236	16	166	14	160	11	305	15	195	13	424	10	19	15	181
							15	392	13	41	17	180	15	145	12	312	16	450	14	249	11	22	16	261
Mean								374		175		188		221		238		266		313		248		303
Third week							16	141	14	255	18	232	16	175	13	344	17	150	15	403	12	29	17	515
							17	182	15	271	19	266	17	120	14	306	18	60	16	292	13	31	18	491
							18	368	16	202	20	134	18	195	15	137	19	142	17	556	14	11	19	17
							19	361	17	140	21	276	19	224	16	354	20	77	18	496	15	289	20	473
							20	258	18	101	22	248	20	196	17	314	21	459	19	471	16	272	21	564
							21	268	19	40	23	273	21	286	18	375	22	483	20	535	17	111	22	394
							22	342	20	270	24	273	22	274	19	388	23	260	21	549	18	37	23	594
Mean								274		183		243		210		317		233		472		112		435
Fourth week							23	373	21	116	25	282	23	212	20	360	24	79	22	234	19	263	24	590
							24	206	22	256	26	50	24	291	21	337	25	297	23	72	20	128	25	137
							25	78	23	239	27	147	25	244	22	228	26	198	24	27	21	472	26	88
							26	79	24	229	28	217	26	171	23	123	27	351	25	22	22	12	27	180
							27	79	25	210	29	244	27	265	24	12	28	60	26	21	23	302	28	486
							28	233	26	253	30	264	28	236	25	30	29	393	27	397	24	465	29	14
							29	204	27	145	1	306	29	65	26	292	30	490	28	559	25	377	30	230
																							31	19
Mean								179		207		216		212		198		267		190		288		218
Fifth week					[1]26	386			28	92					27	240					26	419		
					27	291			29	243					28	350					27	402		
					28	346			30	231					29	384					28	52		
					29	354			31	145					30	218					29	6		
					30	346			1	276					31	255					30	23		
					31	66			2	161					[3]1	315					1	48		
					[2]1	395			3	127					2	76					2	342		
Mean						312				182						262						184		

1946	January		February		March		April		May		June		July		August		September		October		November		December	
	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.
First week	1	508	29	617	26	152	2	314	30	293	4	103	2	143	30	155	3	338	1	266	29	136	3	335
	2	607	30	26	27	47	3	110	1	339	5	162	3	228	31	150	4	399	2	162	30	201	4	345
	3	514	31	14	28	194	4	98	2	333	6	271	4	231	1	4	5	282	3	494	31	343	5	154
	4	443	1	398	1	542	5	152	3	348	7	235	5	203	2	25	6	392	4	462	1	494	6	12
	5	412	2	348	2	184	6	214	4	270	8	218	6	194	3	194	7	342	5	460	2	25	7	239
	6	98	3	563	3	580	7	430	5	100	9	----	7	229	4	190	8	106	6	456	3	31	8	216
	7	6	4	627	4	476	8	305	6	254	10	----	8	239	5	- --	9	52	7	474	4	189	9	14
Mean		370		370		310		232		277		198		210		120		273		396		203		188
Second week	8	296	5	535	5	343	9	101	7	194	11	213	9	68	6	238	10	118	8	290	5	569	10	233
	9	25	6	40	6	431	10	355	8	120	12	112	10	126	7	7	11	217	9	429	6	529	11	482
	10	447	7	293	7	261	11	225	9	296	13	109	11	179	8	213	12	100	10	164	7	440	12	111
	11	461	8	550	8	284	12	347	10	286	14	258	12	232	9	250	13	342	11	500	8	22	13	396
	12	18	9	53	9	239	13	131	11	72	15	253	13	218	10	121	14	168	12	117	9	142	14	479
	13	523	10	546	10	606	14	364	12	90	16	228	14	221	11	236	15	342	13	517	10	289	15	261
	14	361	11	497	11	193	15	135	13	315	17	242	15	196	12	172	16	426	14	505	11	16	16	534
Mean		304		359		337		237		196		202		177		177		244		360		287		356
Third week	15	47	12	597	12	568	16	399	14	264	18	74	16	234	13	76	17	378	15	412	12	451	17	4
	16	625	13	83	13	454	17	410	15	58	19	228	17	226	14	20	18	336	16	401	13	530	18	17
	17	78	14	25	14	459	18	382	16	182	20	229	18	226	15	294	19	388	17	379	14	214	19	383
	18	70	15	270	15	96	19	383	17	96	21	170	19	222	16	167	20	379	18	30	15	360	20	26
	19	590	16	---	16	534	20	313	18	67	22	202	20	204	17	192	21	287	19	550	16	540	21	10
	20	220	17	353	17	258	21	406	19	251	23	234	21	46	18	292	22	97	20	349	17	26	22	---
	21	48	18	508	18	562	22	176	20	273	24	226	22	75	19	20	23	55	21	516	18	331	23	358
Mean	--	240	--	306	--	419	--	352	--	170	--	195	--	176	--	152	--	274	--	377	--	350	--	133
Fourth week	22	89	19	252	19	520	23	363	21	152	25	207	23	106	20	286	24	79	22	491	19	485	24	122
	23	614	20	191	20	508	24	156	22	320	26	197	24	191	21	242	25	140	23	502	20	414	25	263
	24	226	21	662	21	469	25	276	23	310	27	200	25	92	22	216	26	416	24	381	21	228	26	249
	25	205	22	294	22	486	26	46	24	296	28	199	26	210	23	18	27	445	25	439	22	14	27	367
	26	125	23	596	23	512	27	38	25	292	29	211	27	162	24	317	28	364	26	107	23	404	28	3
	27	539	24	68	24	487	28	254	26	207	30	189	28	235	25	327	29	362	27	404	24	220	29	3
	28	270	25	587	25	76	29	75	27	88	1	153	29	229	26	292	30	26	28	114	25	95	30	520
		---		---		---		---		---		---		---		---		---		---		---		---	31	154
Mean	--	295	--	378	--	437	--	172	--	238	--	194	--	175	--	242	--	262	--	348	--	266	--	210
Fifth week	--	---	--	---	26	367	--	---	28	52	--	---	--	---	27	6	--	---	--	---	26	122	--	----
	--	---	--	---	27	461	--	---	29	236	--	---	--	---	28	325	--	---	--	---	27	487	--	---
	--	---	--	---	28	448	--	---	30	272	--	---	--	---	29	124	--	---	--	---	28	284	--	---
	--	---	--	---	29	424	--	---	31	237	--	---	--	---	30	192	--	---	--	---	29	209	--	---
	--	---	--	---	30	253	--	---	1	87	--	---	--	---	31	329	--	---	--	---	30	118	--	---
	--	---	--	---	31	476	--	---	2	41	--	---	--	---	1	334	--	---	--	---	1	58	--	---
	--	---	--	---	1	304	--	---	3	264	--	---	--	---	2	247	--	---	--	---	2	204	--	---
Mean	--	---	--	---	--	390	--	---	--	170	--	---	--	---	--	223	--	---	--	---	--	212	--	---

See footnotes at end of table.

TABLE 3.—*Daily totals and weekly means of solar and sky radiation, plus the radiation reflected from the ground, as received on a vertical surface facing south at Blue Hill, Mass., for the period from Mar. 26, 1946, to Dec. 31, 1947*—Continued

1947	January		February		March		April		May		June		July		August		September		October		November		December	
	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.	date	cal.
First week	1	79	29	67	26	517	2	27	30	193	4	259	2	225	30	264	3	362	1	503	29	37	3	263
	2	26	30	24	27	351	3	447	1	38	5	254	3	256	31	167	4	362	2	151	30	26	4	479
	3	5	31	368	28	376	4	423	2	56	6	246	4	188	1	293	5	124	3	426	31	29	5	13
	4	348	1	549	1	474	5	22	3	51	7	104	5	243	2	300	6	201	4	444	1	---	6	486
	5	481	2	384	2	9	6	175	4	74	8	23	6	225	3	259	7	202	5	369	2	544	7	417
	6	384	3	546	3	104	7	325	5	188	9	155	7	270	4	294	8	221	6	412	3	345	8	9
	7	79	4	41	4	298	8	406	6	138	10	254	8	125	5	288	9	396	7	430	4	30	9	229
Mean	--	200	--	283	--	304	--	261	--	106	--	185	--	219	--	266	--	267	--	391	--	168	--	285
Second week	8	501	5	302	5	360	9	72	7	85	11	260	9	151	6	300	10	386	8	264	5	47	10	465
	9	622	6	331	6	354	10	406	8	194	12	242	10	235	7	217	11	370	9	435	6	22	11	393
	10	378	7	214	7	---	11	380	9	180	13	249	11	187	8	207	12	397	10	426	7	184	12	449
	11	55	8	52	8	---	12	140	10	306	14	131	12	239	9	75	13	230	11	484	8	---	13	508
	12	392	9	390	9	330	13	340	11	288	15	250	13	242	10	248	14	69	12	443	9	416	14	486
	13	500	10	312	10	116	14	37	12	269	16	192	14	235	11	269	15	250	13	325	10	550	15	332
	14	16	11	522	11	187	15	381	13	190	17	215	15	259	12	314	16	176	14	504	11	247	16	241
Mean	--	352	--	303	--	270	--	251	--	216	--	220	--	221	--	233	--	268	--	412	--	244	--	411
Third week	15	47	12	566	12	495	16	96	14	98	18	126	16	195	13	299	17	446	15	491	12	2	17	490
	16	25	13	530	13	486	17	358	15	294	19	203	17	208	14	288	18	421	16	456	13	513	18	221
	17	367	14	367	14	34	18	241	16	277	20	209	18	241	15	277	19	69	17	470	14	545	19	500
	18	446	15	65	15	468	19	---	17	263	21	253	19	86	16	35	20	500	18	288	15	466	20	519
	19	370	16	88	16	492	20	19	18	37	22	237	20	175	17	155	21	106	19	95	16	283	21	296
	20	13	17	111	17	254	21	39	19	244	23	256	21	207	18	194	22	52	20	446	17	521	22	509
	21	362	18	528	18	374	22	288	20	167	24	72	22	110	19	276	23	477	21	514	18	542	23	14
Mean	--	233	--	322	--	372	--	173	--	197	--	194	--	175	--	218	--	296	--	394	--	410	--	364
Fourth week	22	520	19	573	19	513	23	351	21	78	25	179	23	197	20	33	24	187	22	535	19	521	24	513
	23	265	20	330	20	414	24	251	22	41	26	244	24	269	21	147	25	45	23	410	20	165	25	577
	24	216	21	61	21	278	25	71	23	116	27	245	25	---	22	346	26	476	24	450	21	502	26	23
	25	312	22	---	22	393	26	200	24	252	28	226	26	248	23	---	27	483	25	420	22	159	27	53
	26	307	23	---	23	443	27	264	25	218	29	240	27	255	24	337	28	490	26	281	23	77	28	89
	27	38	24	551	24	59	28	352	26	266	30	230	28	186	25	336	29	494	27	430	24	128	29	599
	28	402	25	197	25	187	29	240	27	271	1	242	29	254	26	162	30	166	28	470	25	284	30	588
	--	---	--	---	--	---	--	---	--	---	--	---	--	---	--	---	--	---	--	---	--	---	31	163
Mean	--	294	--	342	--	327	--	247	--	177	--	230	--	235	--	227	--	334	--	414	--	262	--	326
Fifth week	--	---	--	---	26	228	--	---	28	240	--	---	--	---	27	200	--	---	--	---	26	299	--	---
	--	---	--	---	27	405	--	---	29	247	--	---	--	---	28	105	--	---	--	---	27	478	--	---
	--	---	--	---	28	396	--	---	30	174	--	---	--	---	29	297	--	---	--	---	28	38	--	---
	--	---	--	---	29	137	--	---	31	245	--	---	--	---	30	296	--	---	--	---	29	241	--	---
	--	---	--	---	30	416	--	---	1	248	--	---	--	---	31	318	--	---	--	---	30	450	--	---
	--	---	--	---	31	475	--	---	2	201	--	---	--	---	1	332	--	---	--	---	1	539	--	---
	--	---	--	---	1	362	--	---	3	58	--	---	--	---	2	10	--	---	--	---	2	233	--	---
Mean	--	---	--	---	--	346	--	---	--	202	--	---	--	---	--	222	--	---	--	---	--	326	--	---

[1] Date of first measurements taken at Blue Hill.
[2] In this and succeeding columns, early dates appearing at the end of any month refer to the succeeding month.
[3] In this and many succeeding columns, dates from the preceding month have been carried over for the first week of the column month.

Chart I. Departure (°F.) of the Mean Temperature [illegible]

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, January 1948

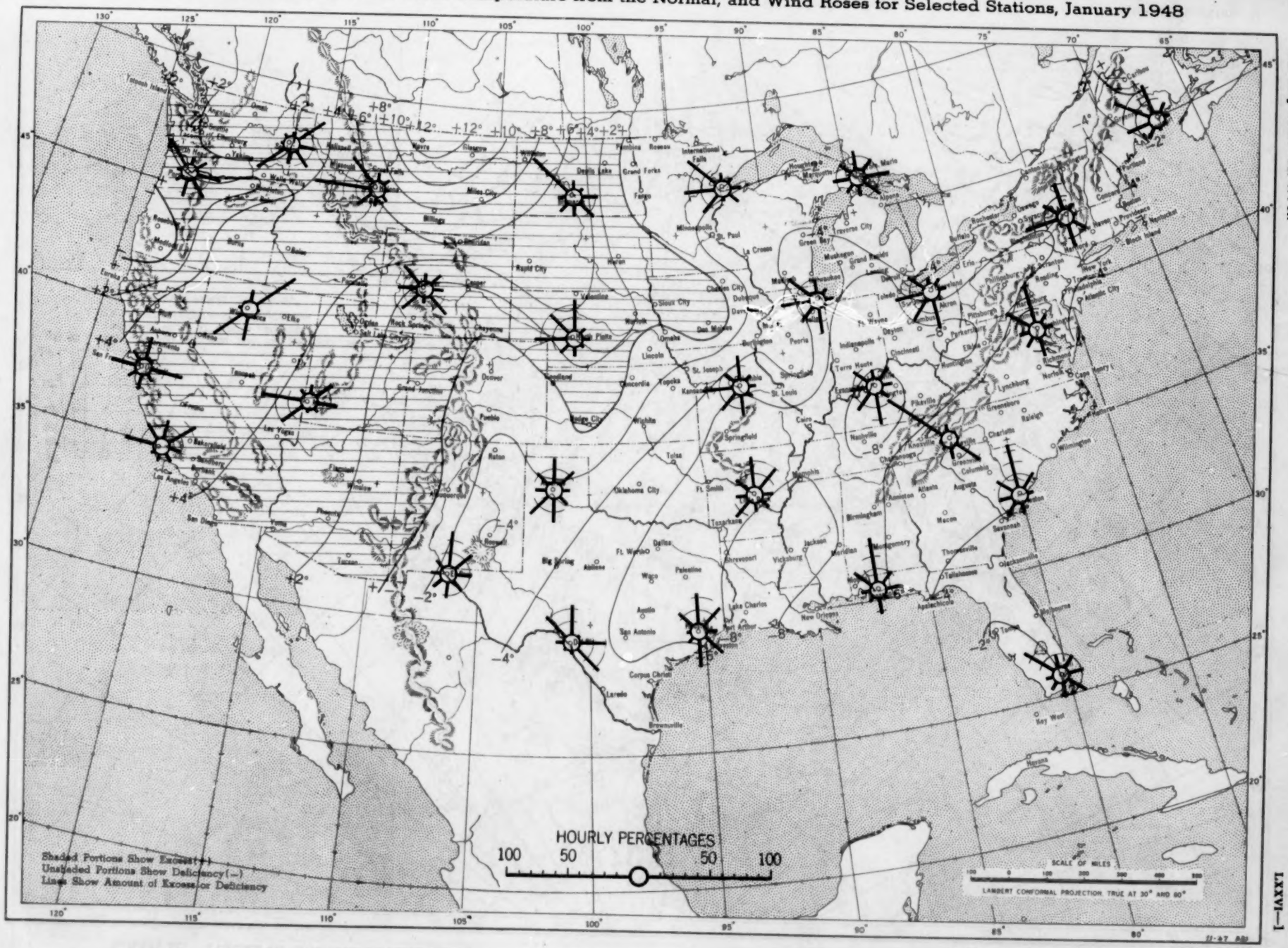
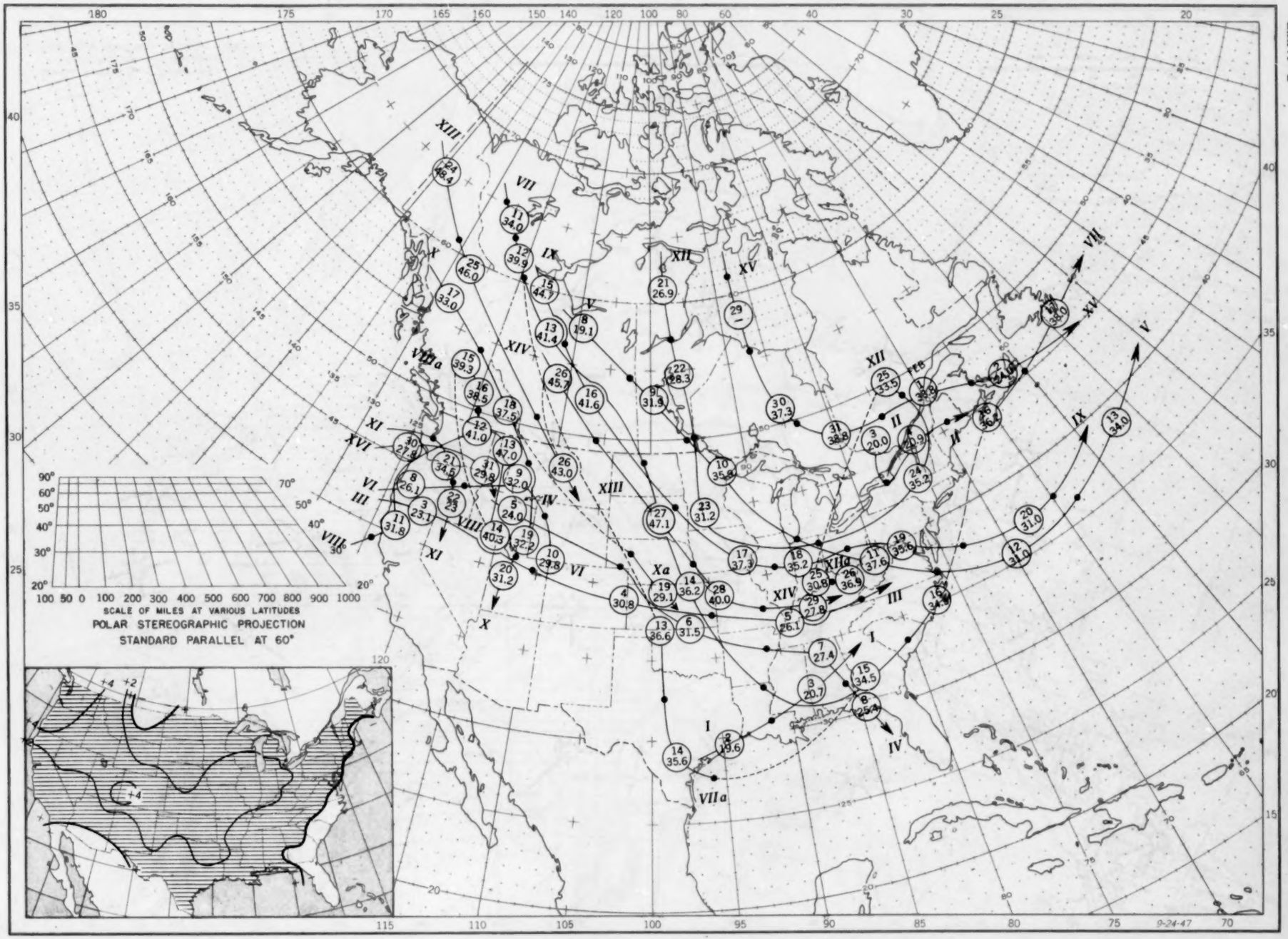

HOURLY PERCENTAGES
100 50 50 100
Shaded Portions Show Excess(+)
Unshaded Portions Show Deficiency(—)
Lines Show Amount of Excess or Deficiency
SCALE OF MILES
LAMBERT CONFORMAL PROJECTION TRUE AT 30° AND 60°

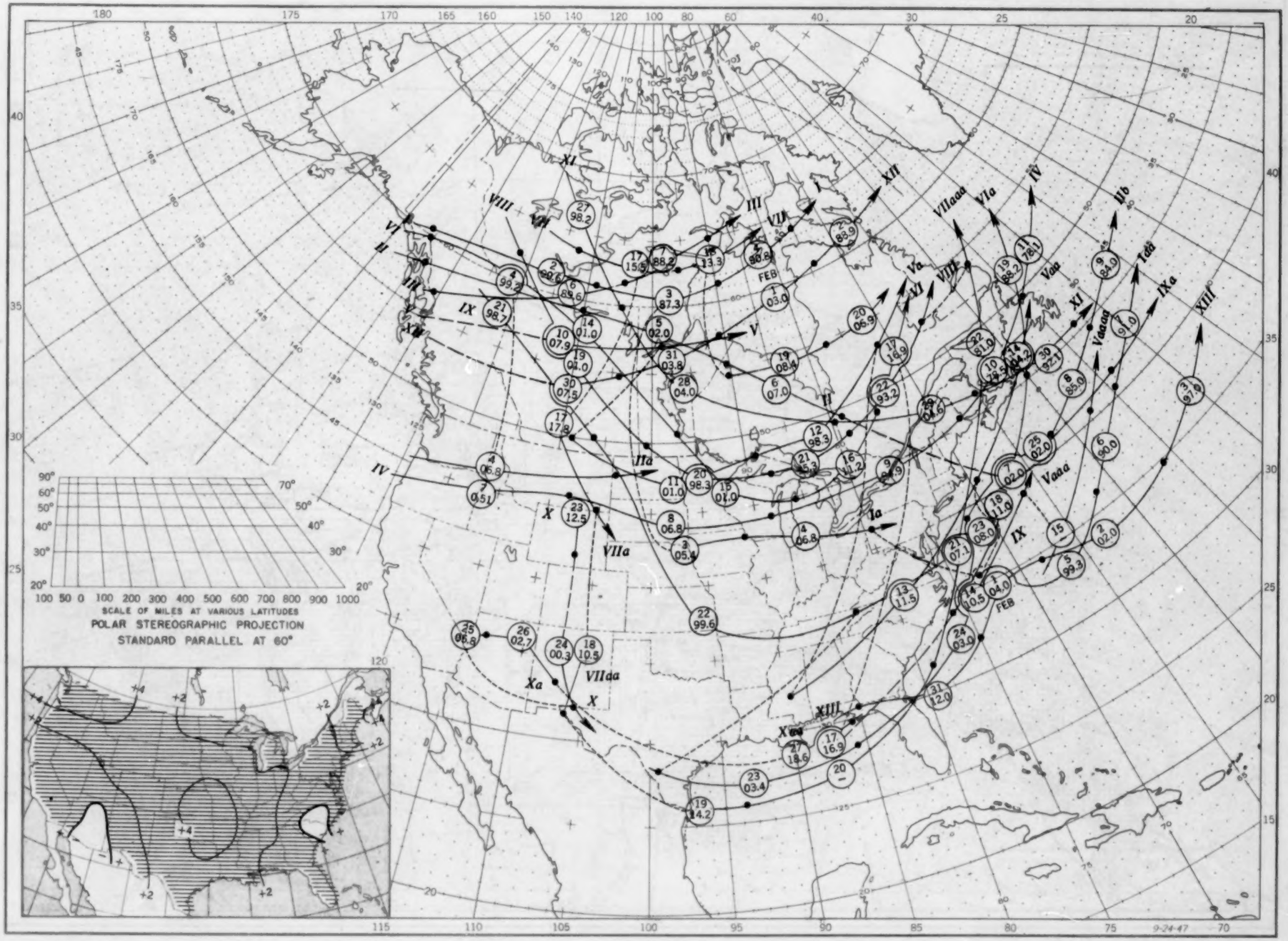
Chart II. Tracks of Centers of Anticyclones, January 1948. (Inset) Departure of Monthly Mean Pressure from Normal



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time)

Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time)

Chart III. Tracks of Centers of Cyclones, January 1948. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time)

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, January 1948

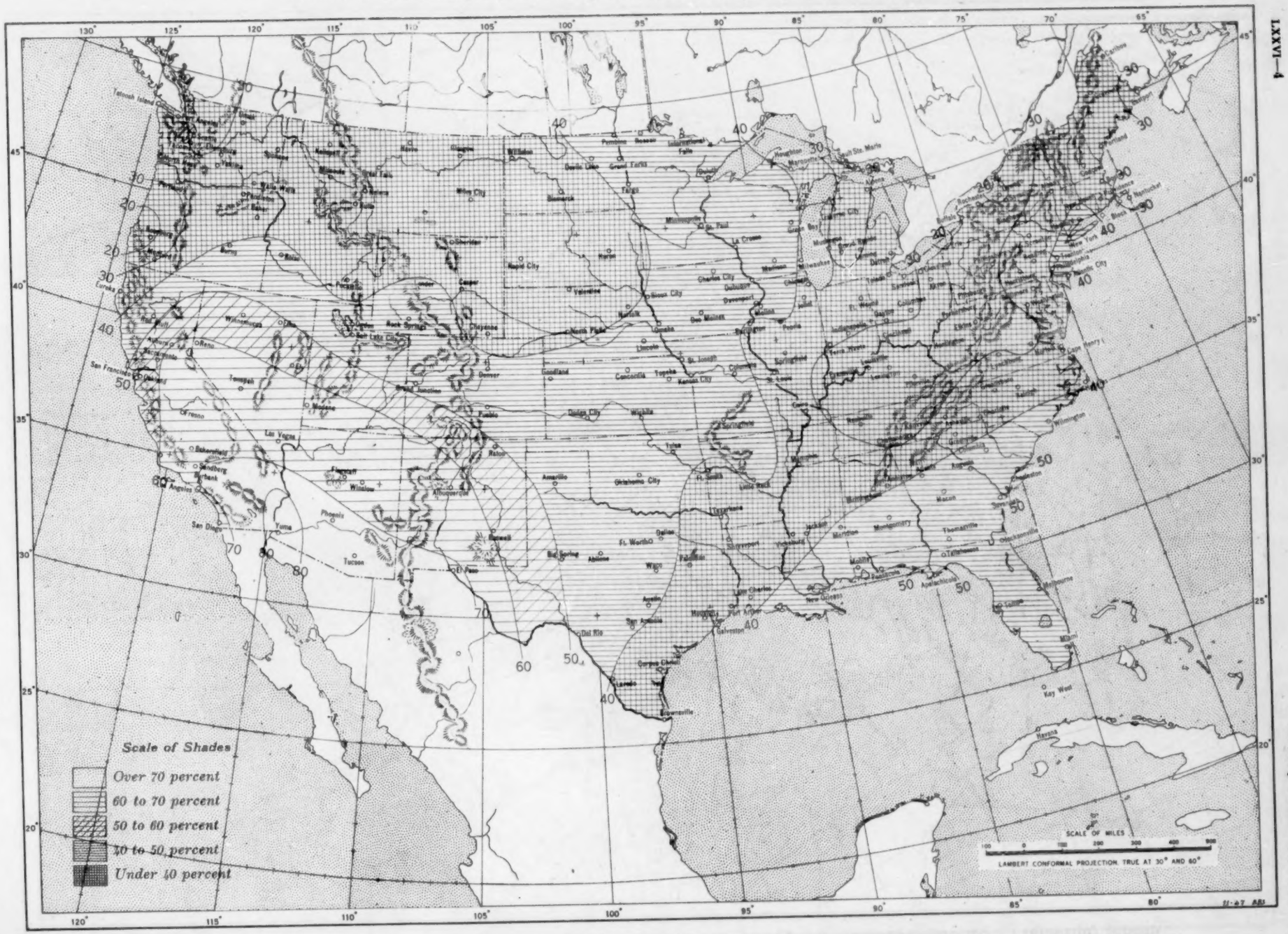

Scale of Shades
Over 70 percent
60 to 70 percent
50 to 60 percent
40 to 50 percent
Under 40 percent
SCALE OF MILES
LAMBERT CONFORMAL PROJECTION, TRUE AT 30° AND 60°

Chart V. Total Precipitation, Inches, January 1948. (Inset) Departure of Precipitation from Normal

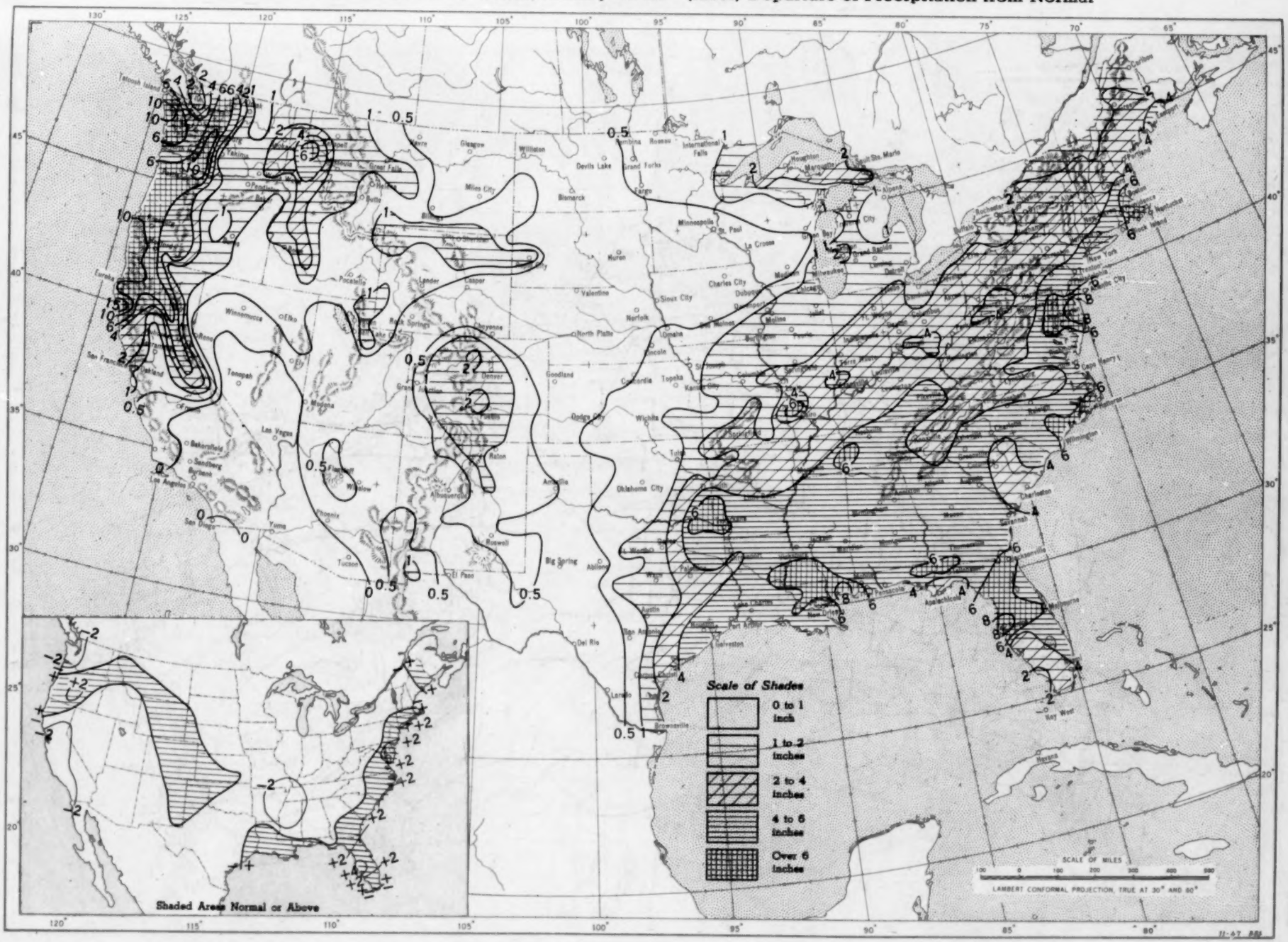

Scale of Shades
0 to 1 inch
1 to 2 inches
2 to 4 inches
4 to 6 inches
Over 6 inches
Shaded Areas Normal or Above
SCALE OF MILES
LAMBERT CONFORMAL PROJECTION, TRUE AT 30° AND 60°

Chart VI. Isobars (mb.), at Sea Level and Isotherms (°F.) at Surface; Prevailing Winds, January 1948

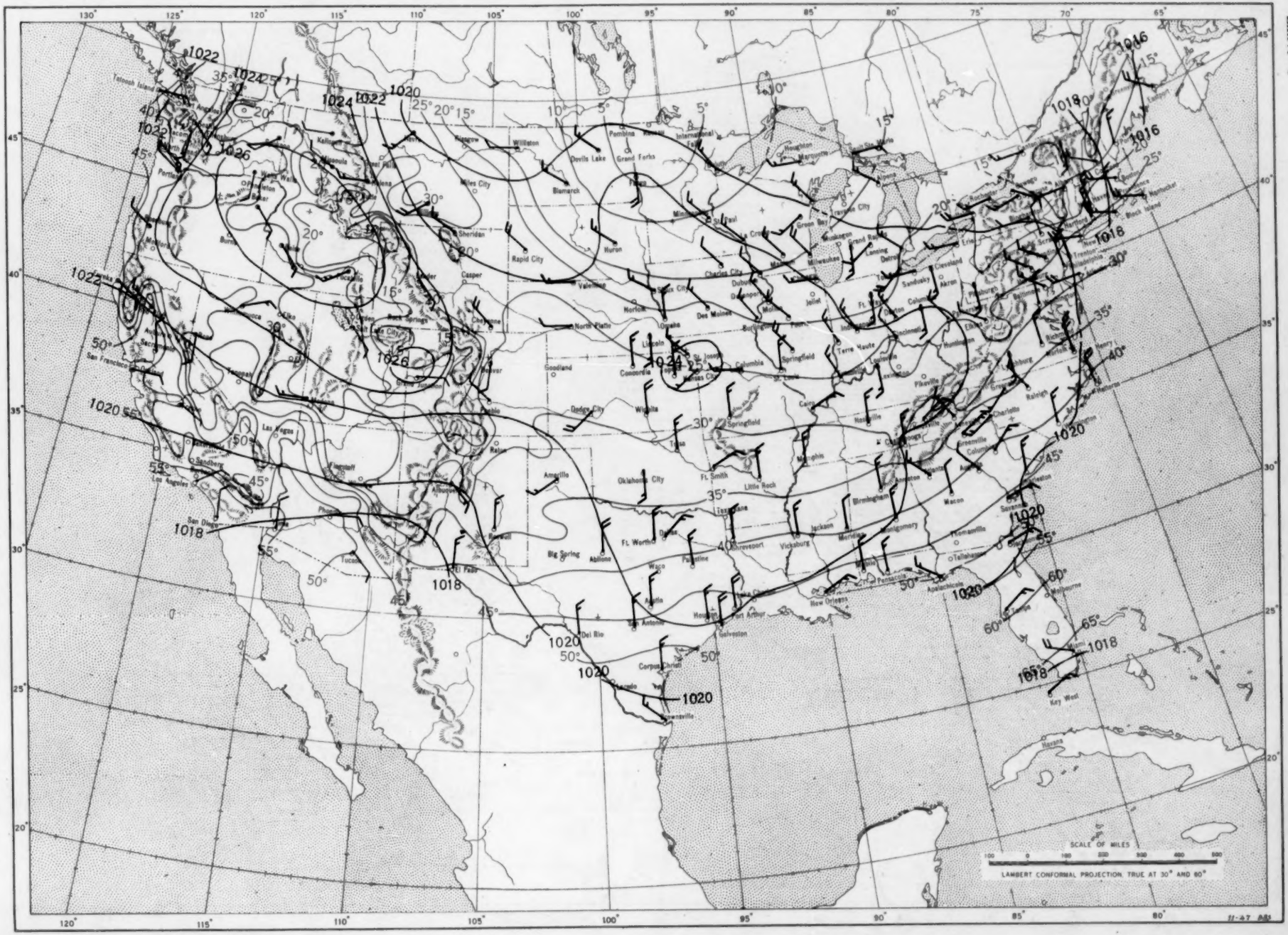


Chart VII. Total Snowfall, Inches, January 1948. (Inset) Depth of Snow on the Ground at 7:30 p. m., January 26, 1948

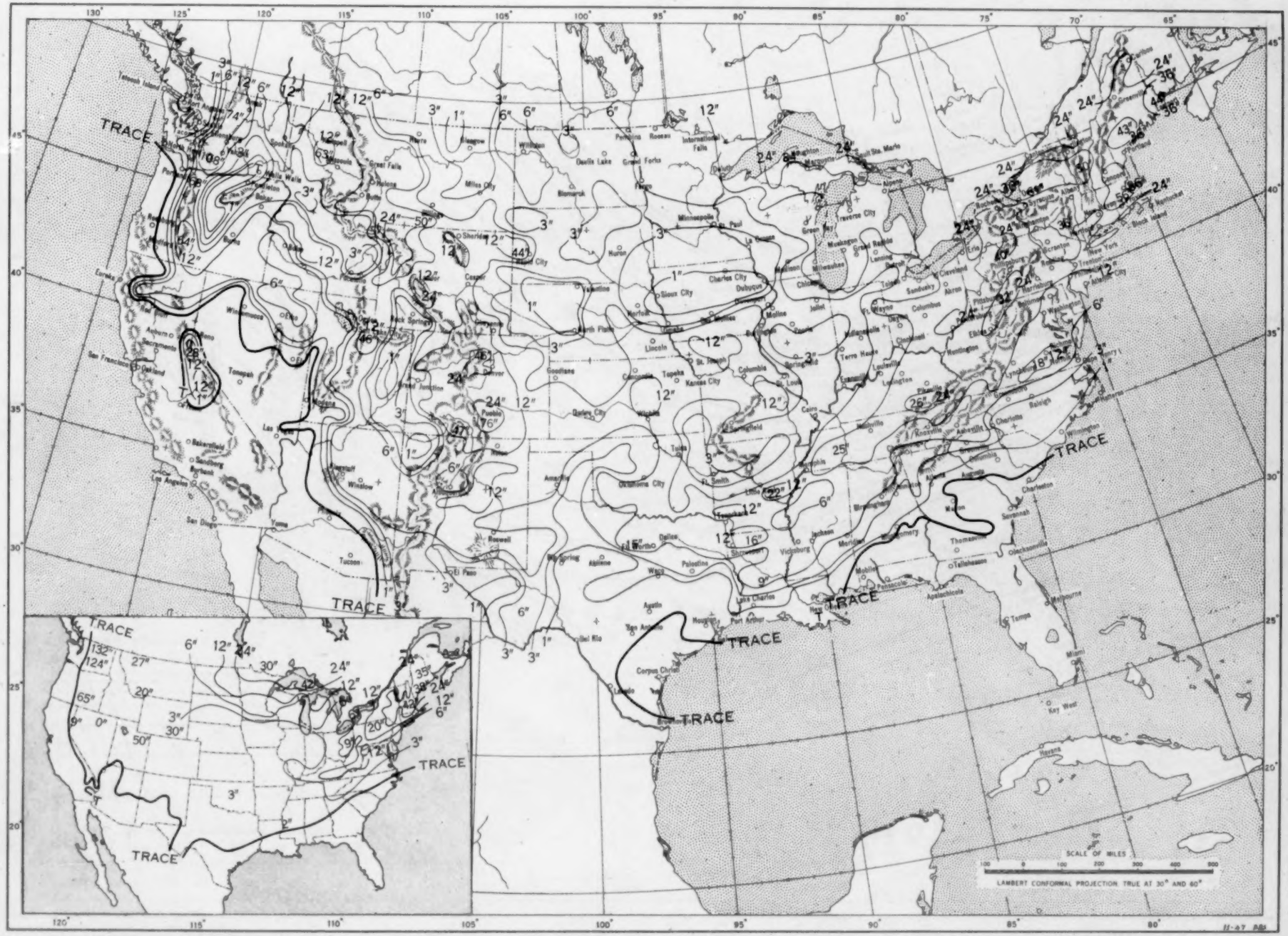
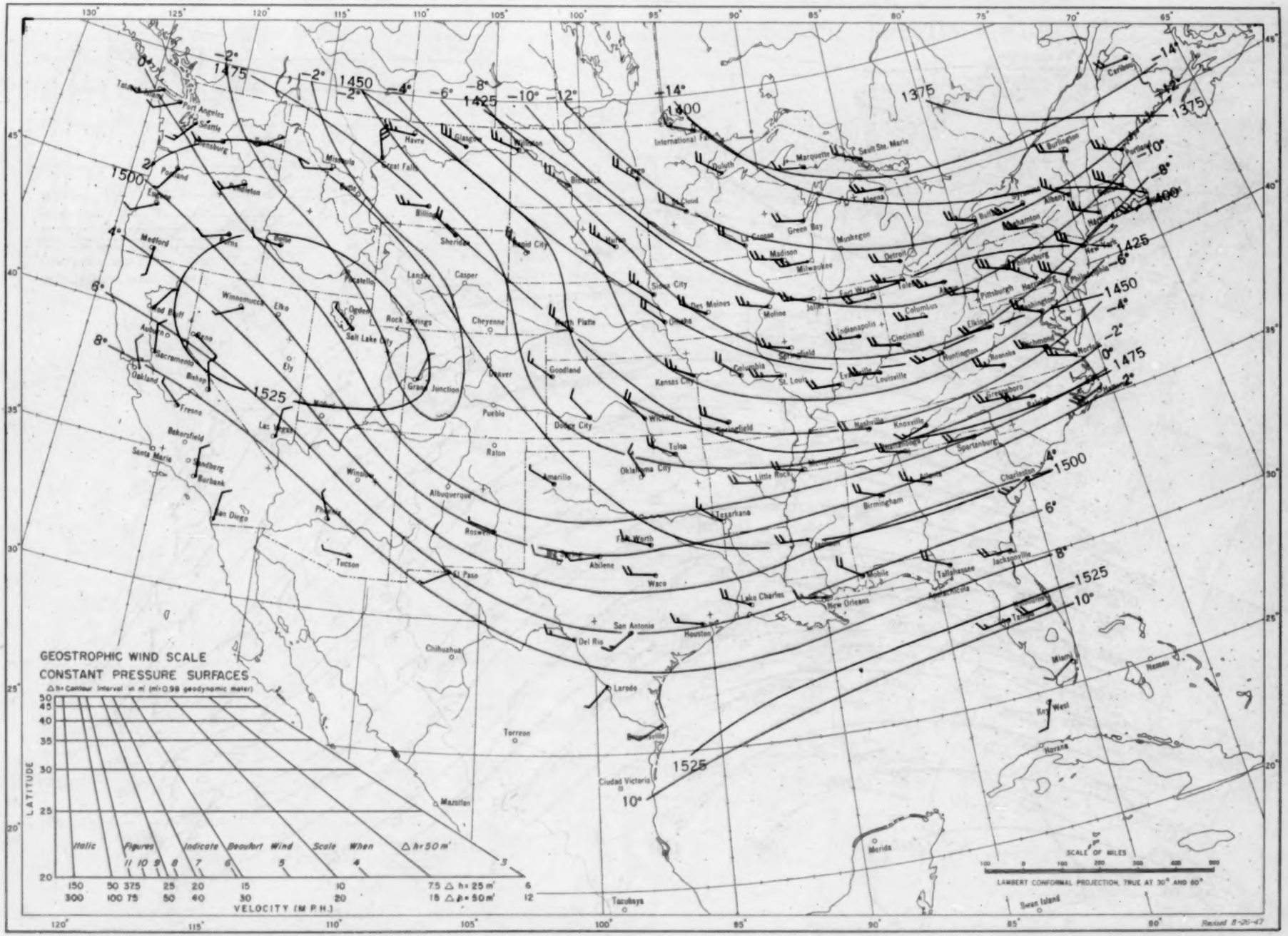


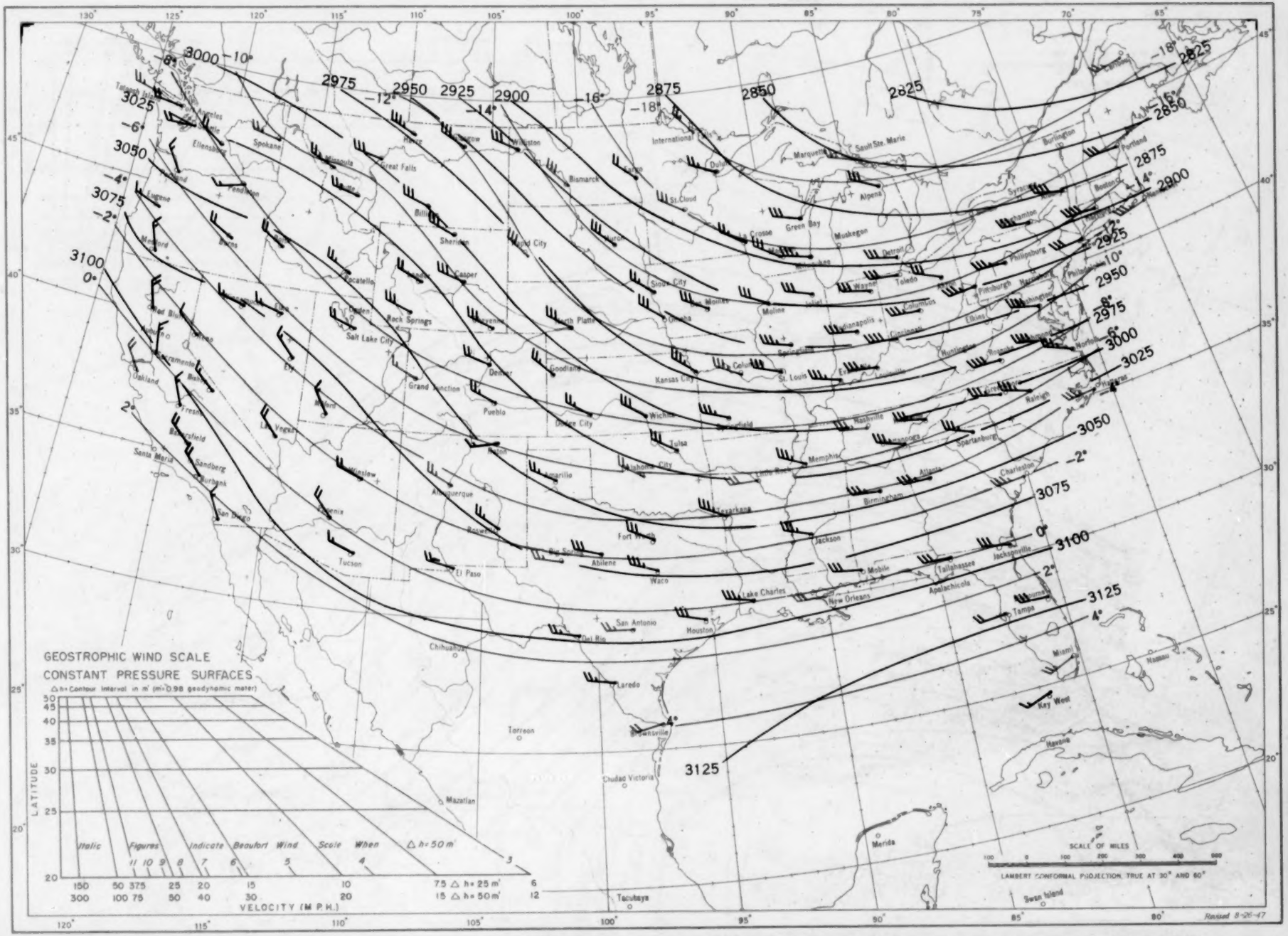
Chart VIII, January 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in

Chart VIII, January 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 850-millibar Pressure Surface, and Resultant Winds at 1,500 Meters (m. s. l.)


GEOSTROPHIC WIND SCALE
CONSTANT PRESSURE SURFACES
Δh= Contour interval in m (m=0.98 geodynamic meter)
LATITUDE
Italic Figures Indicate Beaufort Wind Scale When Δh=50 m'
VELOCITY (M.P.H.)
7.5 Δ h= 25 m'
15 Δ h= 50 m'
SCALE OF MILES
LAMBERT CONFORMAL PROJECTION, TRUE AT 30° AND 60°
Revised 8-26-47

Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2200 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

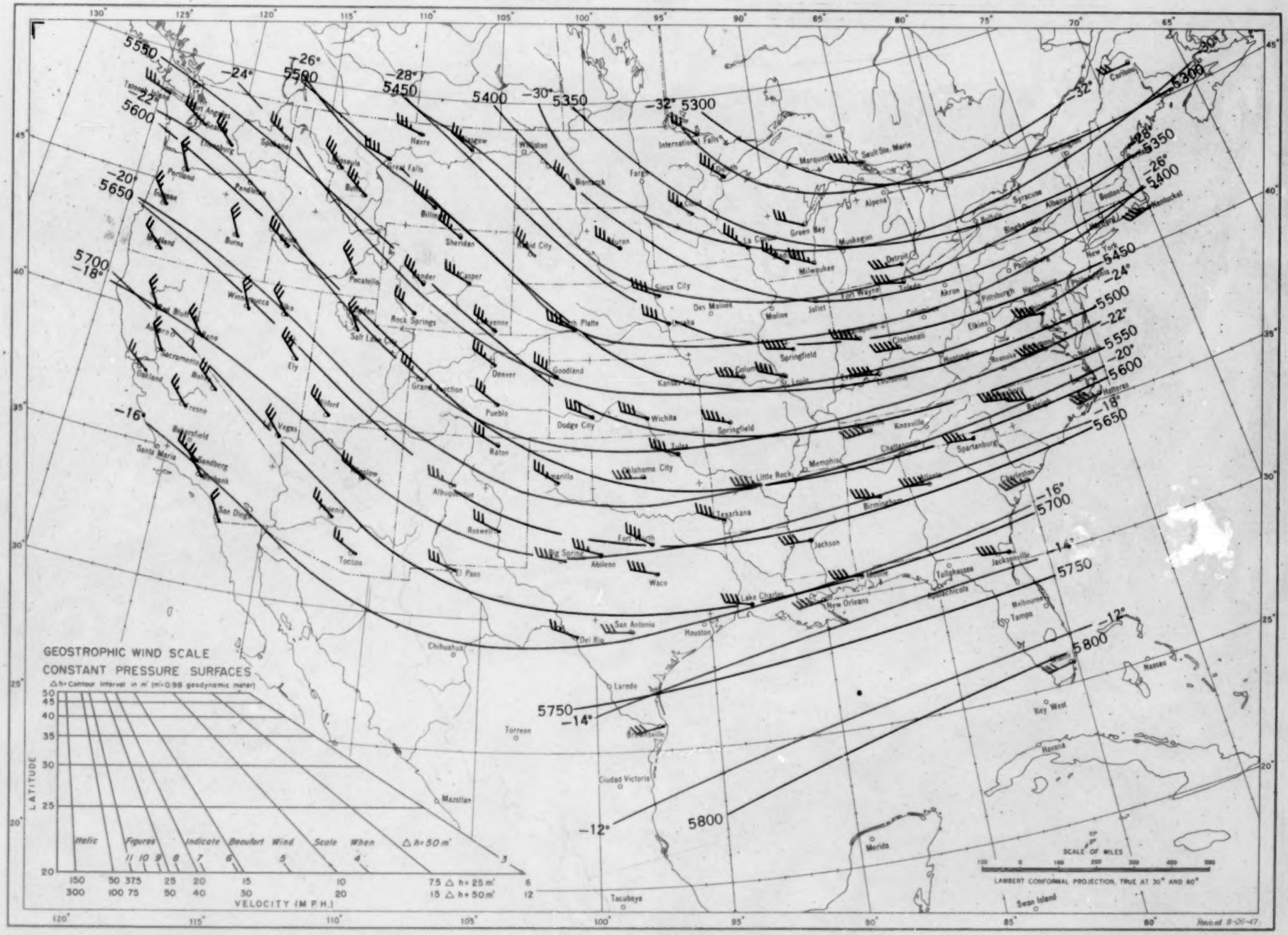
Chart IX, January 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 700-millibar Pressure Surface, and Resultant Winds at 3,000 Meters (m. s. l.)


GEOSTROPHIC WIND SCALE
CONSTANT PRESSURE SURFACES
△h= Contour interval in m' (m'=0.98 geodynamic meter)
LATITUDE
VELOCITY (M.P.H.)
Italic Figures Indicate Beaufort Wind Scale When △h=50 m'
SCALE OF MILES
LAMBERT CONFORMAL PROJECTION, TRUE AT 30° AND 60°
Revised 8-26-47

Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2200 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

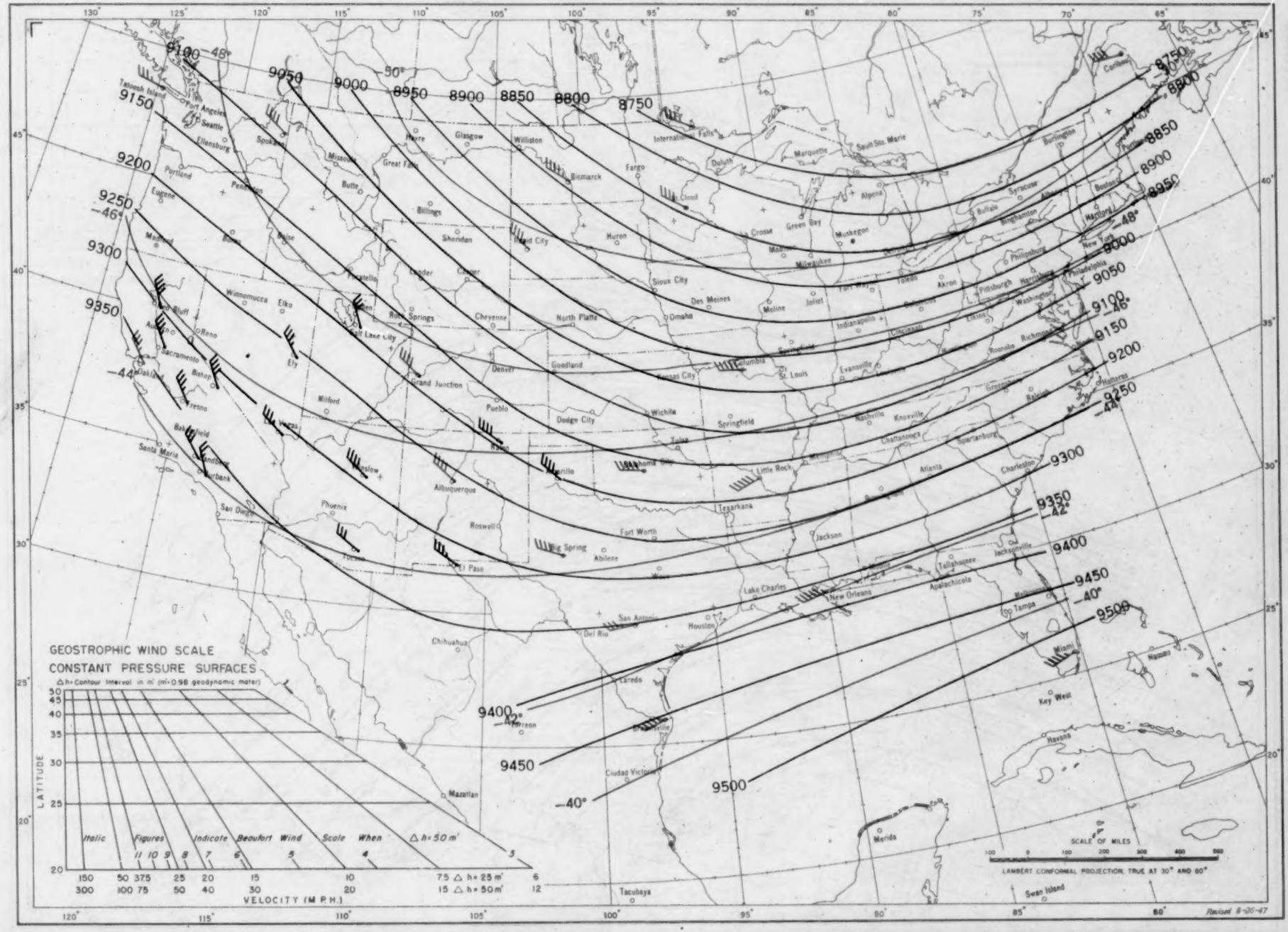
Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2200 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart X, January 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 500-millibar Pressure Surface, and Resultant Winds at 5,000 Meters (m. s. l.)



Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2200 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart XI, January 1948. Contour Lines of Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Isotherms in Degrees Centigrade for the 300-millibar Pressure Surface, and Resultant Winds at 10,000 Meters (m. s. l.)



Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2200 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.